Pride in Alberta

GRADE 6

a teacher handbook

Alberta
AGRICULTURE

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For further information contact:

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PRIDE IN ALBERTA

A Resource Book for Teachers

Division 2

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ALBERTA AGRICULTURE

1988

INTRODUCTION

You are invited to use the material in this handbook in your everyday classroom planning and activities. The integrated lessons use a whole language approach for investigating and participating in social studies and science concepts which are recommended in the current Alberta Education curriculum.

This is the second edition of Pride in Alberta. Revisions have been made to the pilot edition which I hope will reflect the concerns of teachers who evaluated the activities in their classrooms. Probably the most obvious change is that the format is now three separate handbooks which are designed for individual grade levels. I would, however, encourage teachers who may wish to borrow lessons not specifically designed for this grade level to do so. These activities are intended to be modified and adapted to your special needs and the particular needs and interests of your students. Many educators who have attended workshops which highlight these handbooks have expressed the usefulness of the handbooks for enrichment and split classes. I sincerely hope that they can be used effectively in your classrooms.

To assist you in the use of this resource, I would like to draw your attention to a few of the features of the handbook. First, and probably most useful, is the Curriculum Connection Chart. Use this to select activities for particular subjects and topics. This will give you an overview of the handbook and should help you to include some of this material in your overall plan. Second, each activity includes a covering lesson summary which should further clarify the activity including objectives and materials required. Lesson plans and resources should make for simplified preparation and execution. The student worksheets are intended to be used as thought and activity organizers rather than a workbook approach to seat work. These may be most effectively used in organizing student group work and the planning of independent work or tasks.

Alberta Agriculture film library and publications library may have some additional relevant resources. You are encouraged to write for a publication list and a film catalogue.

Alberta Agriculture
Publications Office
or Film Library
7000 - 113 Street
EDMONTON, Alberta
T6H 5T6

The original writing and subsequent revision of this resource has been a most enlightening experience. I have re-established communications with classroom teachers while increasing my understanding of the significant role of Agriculture in Alberta society in the past, for the present, and in the future. Work with the Ag. in the Classroom Program has been an exciting experience. I hope that the enthusiasm I feel personally is reflected in the presentation of the following activities.

CREDITS

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to all teachers who evaluated this pilot edition, and to the review committee from Alberta Education.

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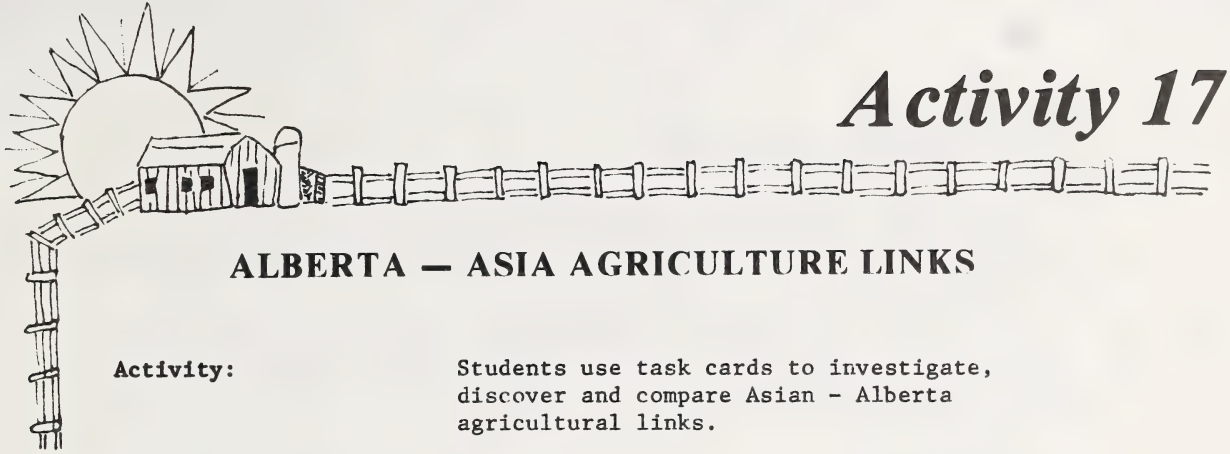
THE WORKSHEETS

Curriculum Connection

LESSON TITLE	SUBJECT AREA	CURRICULUM CONNECTION
"The Asia-Alberta Exchange"	Social Studies	How people in eastern societies meet their needs today. International agencies.
"People, Natural Resources and Independence"	Social Studies	How people in earlier times met their needs. Trade, self sufficiency, interdependence. Alberta, Past, Present, Future: Natural Resources, Human Needs (Grade 4)
"Perils of the Soil"	Language Arts	Reading for comprehension.
	Science	Conservation of a natural resource - soil.
"Erosion, Soil Loss and Farming Techniques"	Science	Earth, Space and Time. Water and Land.
"Weather or Not Game"	Science	Earth, Space and Time. Weather patterns, measuring and predicting weather condition which influence our lives.
	Mathematics	Arithmetic Skills.
"Environment or Adaptation"	Science	Living things and Environment. Environmental Factors. Adaptation.
"Natural Food Production"	Language Arts	Reading Comprehension. Speech Development.
"Agribusiness in the News"	Language Arts	Reading for information.
"The Agribusiness Game"	Social Studies	Canada's industrial development.



Activity 17

ALBERTA — ASIA AGRICULTURE LINKS

Activity: Students use task cards to investigate, discover and compare Asian - Alberta agricultural links.

Subject Area: Social Studies.

Curriculum Direction: How people from eastern societies meet their needs.

Major Concepts: Customs and traditions.

Cross cultural sharing.

International agencies.

Lesson Concept: Some Eastern societies look to Western products and technology to provide solutions to their problems.

Purpose: To introduce students to a twinning program between Alberta and Asian provinces which focuses on an Agricultural exchange as a major part of it's activities.

To provide an opportunity for students to practice their research skills.

To improve listening skills.

Materials Required: Supplied in this lesson.
Map of the world.

Time Required: 3 class periods.

BACKGROUND — to the teacher

The twinning of Alberta with three Asian provinces has led to a variety of exchanges. The focus of this lesson is on the agricultural similarities which have resulted in a sharing of technology and resources from this industry.

The following information is quoted from the Asia-Alberta Exchange, the newsletter of Alberta's activities with Asia, and from the Overview reports from the Exchange.

PROCEDURE

Part 1

Introduction:

1. In a discussion, have the students review some of the physical features of Alberta. Where is it located relative to the north pole? Discuss our weather patterns.

2. On a map or atlas, find the location of our twin Asian provinces.

   Review some of the physical and climatic conditions found in these areas. (See the resource materials.)

3. Based on similarity of geography, ask the students to suggest what agricultural products these Provinces may produce.

4. Review the background to the Asia-Alberta Exchange at the beginning of this lesson.

Part 2

Researching:

5. Divide the class into 3 groups. Group one will research the Japan twinning project. Group two will research the Korea twinning project. Group three will research the China twinning project.

6. Review the tasks on each of the task lists to assure that the students understand what is required.

7. Give each group two or three copies of the resource material on their province.

8. Give each group a task list for their country and ask them to complete either individually or as a group, at least 7 of the tasks.

Conclusion:

9. Each group will present their findings to the class.

10. Have a question period at the end of each presentation so that facts can be clarified.

FOR DISCUSSION

1. If a herd of cattle was exported from Alberta to Asia, how would their new environment compare with Alberta?

2. Why is this such a valuable program to the Asian communities?

3. What might Alberta be able to learn from these people?

RELATED ACTIVITIES

1. Contact some of the schools in Alberta that have twin schools in Asia and see about contributing information to their communication packages.

2. Subscribe to the Asia-Alberta Exchange news letters and information.

   Address:

   Asia Alberta Newsletter
   Mrs. Barb Deters, Director of Communications
   Alberta Federal & Intergovernmental Affairs
   14th Floor, South Tower, 10030 - 107 Street
   EDMONTON, Alberta
   T5J 3E4

3. Using the information given in the resource "Alberta Gives Tips on Farm Management", do the supplementary lesson provided.

THE ASIA-ALBERTA EXCHANGE

The relationships which Alberta has established with the provinces of Hokkaido in Japan, Heilongjiang in China, and Gangweon* in Korea are indeed special. They are not associations in name only, but rather involve a great many reciprocal activities and programs in a variety of areas. Ours is the only Canadian province to date to engage in international affiliations of this nature.

Why does Alberta have this kind of relationship with three provinces in Asia? These special relationships develop mutual trust and understanding between the partners, vital elements in any dealings with Japan, China, and Korea. The relationships are highly regarded and deemed to be important by both Alberta and the Asian provinces and by the respective central governments as well. Alberta is accorded a great deal of recognition for its role in these affiliations.

Perhaps the strongest link between Alberta and each of the three Asian provinces is that they are all located in northern regions. They are all winter provinces, with similarities in climate, geography, and resources - providing common ground for cooperation in resource development, agriculture, forestry, technology, trade, culture, education and sports. Through the years, between 80 and 90 per cent of the exchange activities relate, directly or indirectly, to adaptations we must make because of our shared northern concerns.

Together, through these special relationships, we have built an effective cultural bridge for continued cooperation and exchange. The partners have developed and expanded shared interests in economic, technological and many other spheres. Alberta considers Japan, China and Korea to be important trading partners, and these special relationships have enhanced opportunities and provided mutual benefits.

Each of the special relationships has been formally established. Alberta and Gangweon signed a reciprocal agreement in 1974; Alberta and Hokkaido signed a Proclamation of Friendship and Affiliation in 1980; and Alberta and Heilongjiang signed a Protocal of Understanding and Friendship in 1981. Sub-agreements have been signed in sports, trade, medicine, agriculture, and petroleum technology; and official government

delegations have exchanged numerous visits. As well, universities in the Asian provinces have established affiliations with universities in Alberta; and primary and secondary schools have formalized "twinning" relationships with similar schools in our sister provinces.

Managed and coordinated by the Alberta Government Committee on Special Relationships, with representation from several departments, these affiliations have touched many people. They are a unique source of trust and mutual understanding across international boundaries.

*Editor's Note: The name Gangweon has since been changed to Kangwon and the new name is used in some of the texts in these articles.

TASKS — JAPAN

1. Find three agricultural products that are grown in Japan that are also grown in Alberta.

2. Locate Japan on a world map and prepare a map for display.

3. Compare the location of Japan to that of Alberta relative to the North pole on a globe and write down the latitudes of both locations.

4. Find an agricultural product that Alberta exports to Japan and make a poster that could be used to promote its consumption in Japan.

5. How many food products in your home come from Japan? Find a recipe for a Japanese dish.

6. Based on the past exports, make a prediction for the future of Alberta honey sales to Japan. Will they increase or decrease?

7. Imagine that you are to take a tour of a rural area of Japan and you have been asked to take photographs of things of interest to Alberta farmers. Make a list of 10 pictures that might be included in your album.

8. Compose a short pop song with lyrics that would describe rural Alberta. This becomes a smash country and western hit in Japan. Sing it for the class.

9. How does technology in Japan's Province of Hokkaido compare to Alberta's other Asian sister provinces?

10. Build a mobile of cut out shapes of the Asian provinces and decorate them with pictures of their agricultural products.

11. Survey another grade 6 class to find out how many students can answer correctly the following questions:

    a) Where is Japan?
    b) Is Japan's climate hot, cold, or temperate?
    c) Are most of the farms in Japan mechanized?
    d) In what Asian countries does Alberta have sister provinces?
    e) Name one Alberta farm product that is exported to Japan.

    Prepare your findings.

    a) Which questions got the most correct responses?
    b) Which questions got the most incorrect responses?
    c) Explain any surprising results from your survey.

TASKS — KOREA

1. Find three agricultural products which are grown in Korea and which are also grown in Alberta.

2. Locate Korea on a world map and prepare a map for display.

3. Compare the location of Korea to that of Alberta relative to the North pole on a globe and write down the altitudes of both locations.

4. Find an agricultural product that Alberta exports to Korea and make a poster that could be used to promote its consumption in Korea.

5. How many food products in your home come from Korea? Find a recipe for a Korean dish.

6. Based on the past exports, make a prediction for the future of Alberta honey sales to Korea. Will they increase or decrease?

7. Imagine that you are to take a tour of a rural area of Korea and you have been asked to take photographs of things of interest to Alberta farmers. Make a list of 10 pictures that might be included in your album.

8. Compose a short pop song with lyrics that would describe rural Alberta. This becomes a smash country and western hit in Korea. Sing it for the class.

9. How does technology in Korea's provinces of Kangwon compare to Alberta's other Asian sister provinces?

10. Build a mobile of cut out shapes of the Asian provinces and decorate them with pictures of their agricultural products.

11. Survey another grade 6 class to find out how many students can answer correctly the following questions:

    a) Where is Korea?
    b) Is Korea's climate hot, cold, or temperate?
    c) Are most of the farms in Korea mechanized?
    d) In what Asian countries does Alberta have sister provinces?
    e) Name one Alberta farm product that is exported to Korea.

    Prepare your findings.

    a) Which questions got the most correct responses?
    b) Which questions got the most incorrect responses?
    c) Explain any surprising results from your survey.

TASKS — CHINA

1. Find three agricultural products that are grown in China that are also grown in Alberta.

2. Locate China on a world map and prepare a map for display.

3. Compare the location of China to that of Alberta relative to the North pole on a globe and write down the latitudes of both locations.

4. Find an agricultural product that Alberta exports to China and make a poster that could be used to promote its consumption in China.

5. How many food products in your home come from China? Find a recipe for a Chinese dish.

6. Based on the past exports, make a prediction for the future of Alberta honey sales to China. Will they increase or decrease.

7. Imagine that you are to take a tour of a rural area of China and you have been asked to take photographs of things of interest to Alberta farmers. Make a list of 10 pictures that might be included in your album.

8. Compose a short pop song with lyrics that would describe rural Alberta. This becomes a smash country and western hit in China. Sing it for the class.

9. How does technology in China's provinces of Heilongjiang compare to Alberta's other Asian sister provinces?

10. Build a mobile of cut out shapes of the Asian provinces and decorate them with pictures of their agricultural products.

11. Survey another grade 6 class to find out how many students can answer correctly the following questions.

    a) Where is China?
    b) Is China's climate hot, cold, or temperate?
    c) Are most of the farms in China mechanized?
    d) In what Asian countries does Alberta have sister provinces?
    e) Name one Alberta farm product that is exported to China.

    Prepare your findings.

    a) Which questions got the most correct responses?
    b) Which questions got the most incorrect responses?
    c) Explain any surprising results from your survey.

BEEFING — UP ASIA

To the Teacher:

This lesson is recommended for students who are familiar with beef production or for enrichment purposes.

PROCEDURE

Highlight the information on the Farm Demonstration Project with Kangwon, Korea. Since much of the area in this province is unsuitable for cultivation, the land is better used to provide forage for cattle and thus produce food for the citizens. In order to get maximum benefit from this operation, the best livestock and the best forage should be used. This country looks to Alberta for assistance in development in both of these areas.

The Activity:

Ask the students to imagine that they are owners of a large cattle ranch here in Alberta. They have been approached to supply some stock to a demonstration farm in Asia. They will be sending some of their best animals.

As a class, or in groups, have the students prepare instructions for the care and feeding of these very valuable animals.

Description of the Animals Selected for Export

Animal Number	Breed	Age	Sex
1	Angus	2 years	Female
2	Angus	1 year	Male
3	Hereford	2 years	Female
4	Hereford	2 years	Female
5	Semmital	2 years	Male
6	Charolais	2 years	Male
7	Charolais	1 year	Female

These animals will be used to improve the quality of the native cattle. It is essential that they be maintained in excellent condition so that they will be able to be as productive as possible.

Good care of these animals should include.

- Feed
- Preventative Medicine
- Handling
- Accommodation

You may choose to assign a group of students to prepare the directions for each of these aspects of care.

Conclusion:

When the students have prepared their care directions, have them find pictures which may help to illustrate their recommendations. If the activity has been done in groups, have each group present their directions to the class. If the activity has been done by the whole class, they could create a display of the material and illustrations on a bulletin board in the classroom.

Student Resource

JAPAN

AN OVERVIEW OF THE SPECIAL RELATIONSHIP

BETWEEN ALBERTA AND HOKKAIDO

Hokkaido, the northernmost of Japan's four major islands, has much in common with Alberta. Both are located in northern regions, have agriculture-based economies, and share similar climates and topography. Hokkaido has rich agricultural resources (it's main products are rice, wheat, beans and potatoes) and a large dairy and livestock industry.

There is strong potential for sales in different breeds of cattle, additional cattle feed and forage seed. There is also potential for consulting services in pasture management, food processing, livestock production and forage seed development. Recently, Hokkaido officials have agreed to give active consideration to Alberta's participation in a major (10,000 hectare) beef development project. As well, there have been modest sales of peat moss, whiskey, honey and cheese. Alberta Agriculture was involved in further food promotion at the Alberta Food Show held in Hokkaido in September, 1985. A notable result of the Alberta-Hokkaido affiliation in the commercial area was the purchase by the Hokkaido Takushoku Bank of a ten percent interest in the Bank of Alberta, in a deal worth $3.94 million. Ongoing sales of log homes to Hokkaido by WPM Handcrafted Log Homes Ltd., a local Spruce Grove manufacturer, are another feature of the commercial interaction between the provinces.

ISLAND OF HOKKAIDO
JAPAN'S SECOND LARGEST

Hokkaido is rich in agricultural resources - a major producer of dairy products, sugar beets, wheat, beans, and livestock. Fishing is also a major industry, with the 2700-kilometre coast yielding abundant hauls of herring, salmon, and kelp.

AGRICULTURE

Alberta and Hokkaido have developed strong links in agriculture, both in terms of the continuing agricultural exchange program and successful trade ventures. Each year, Alberta sells about 300 head of Angus beef cattle, 8,000 tonnes of animal feed (mostly dehydrated alfalfa), and 300 tonnes of forage seed to Hokkaido. In addition, Alberta peat moss, whiskey, and honey register modest sales in the sister Japanese province.

Alberta Agriculture has introduced five varieties of Alberta cheese into the Japanese market. Although, even in Hokkaido, the dairy capital of Japan, cheese is comparatively new to people's diet, sales have been steadily increasing. Jackson Gardner, international trade director, Alberta Agriculture, says that cheese is continuing to do well. "In fact, we are sending a mission of cheese producers to Hokkaido." he adds.

Mr. Gardner says that diversification in agriculture in Hokkaido has presented new opportunities for cooperation between the sister provinces. Hokkaido has embarked on a major (10,000 hectare) beef development project, and Mr. Gardner says that Alberta may be involved in technical assistance.

These are indications that Alberta may be able to provide other breeds of cattle, additional feed and forage seed, and consulting services in livestock and pasture management. Potential is good for joint ventures

in Hokkaido in food processing, livestock production, and forage seed development. Alberta has also hosted several agriculture missions from Hokkaido, including dehydrated alfalfa research specialists.

Agriculture will continue to be important in the further development of the special relationship between Alberta and Hokkaido.

Student Resource

KOREA

ALBERTA-KANGWON OVERVIEW

Alberta and Kangwon became sister provinces on September 3, 1974 during a visit by the Honourable Hugh Horner. Little activity took place until 1979, when agricultural cooperation was initiated. Recently, there has been increasing activity in the areas of education and sports.

Kangwon is a region of dramatic natural beauty. An area of 16,893 sq. km, it has a population of 2 million people and is a popular, year-round resort, attracting thousands of tourists. Its rugged mountain streams, beautiful lakes, hot springs, and deep underground limestone caves bring many visitors for hiking, mountain climbing and skiing to the area; while the shallow waters and gentle currents of the coastal area on the Sea of Japan invite them for summer recreation. Kangwon is also rich in traditional culture and history, and the area is studded with temples and ancient pagodas.

An economy based on agriculture makes Kangwon an ideal partner for Alberta. The major crop is rice, but Kangwon ranks first in South Korea in the production of potatoes and corn. Farmers also harvest barley, wheat, tobacco, and market vegetables such as radishes, cabbages, and the red peppers so central to their cooking. In addition, Kangwon is an important supplier of alpine vegetables to the other provinces.

The highland regions offer fine pasture for beef and dairy herds. Throughout the past 10 years, with the imports of Alberta breeding stock and the technical consulting services of livestock and pasture management experts from our province, there has been considerable development and improvement in this area.

Agricultural cooperation began with a farm demonstration project, which was officially opened by the Honourable Dallas Schmidt in October 1979. Initially Alberta Agriculture and the Cattle Breeders Association

jointly donated 33 heads of Brown Swiss, Limousin, Charolais, Herefords and Angus, to be placed on a demonstration farm and crossbred with Korean cattle to demonstrate improved characteristics. Alberta has also sent an animal expert (Terry Lee) to visit and lecture on how to improve the forage and livestock industries. The Honourable James D. Horsman visited the farm during his visit to Kangwon in December 1983.

Agriculture is also the focus of Alberta's commercial interests in Kangwon. In the past, Kangwon has bought beef cattle from Alberta at the rate of 4,000 head per year and has expressed interest in other breeds of cattle (Charolais). We are also selling modest amounts of hides, grains (rye, oats), animal feeds (including canola meal, grain screening pellets), and are involved in providing consulting services (in livestock and pasture management). There are good indications that canola meal sales will increase significantly and important potential exists for significant sales of Alberta alfalfa, forage seeds, barley, swine, breeding stock, and additional consulting services in livestock and pasture management. There is also potential for technical cooperation and consulting services in forestry management and for the sale of root trainers. The Alberta-Kangwon farm demonstration project will continue to present growing commercial opportunities in the area of livestock production. The Honourable LeRoy Fjordbotten visited Kangwon in June, 1984 to examine these areas of cooperation.

Student Resource

SHARED INTEREST IN AGRICULTURE

From the very beginning, Alberta and Kangwon have recognized their shared interests in agriculture. The sister relationship has focused on those interests and through the years, the resulting trade and consultations have been productive.

The Honourable LeRoy Fjordbotten, Alberta's former minister of Agriculture, visited Kangwon in the spring, 1983 to reinforce existing trade markets and to examine new opportunities for cooperation. Discussions with both central and provincial government officials were promising. "Everyone I met with was impressed with Alberta's performance as a long-term, consistent supplier of high quality products, " Mr. Fjordbotten said. "There is great potential for increasing our share of the Korean markets."

The minister discussed the possibility of increasing the imports of Alberta beef cattle to Korea. Present sales stand at about 4,000 head of beef cattle each year to Kangwon and those sales are important for the whole Korean market. The breed which has been most successful for the Kangwon farmers has been Alberta Simmental, and the farmers have indicated their preferences to the central government. According to Alberta Agriculture information, 60 percent of all cattle imported by Korea are now Simmental and that augers well for Alberta producers.

The other major area of trade has been grain. Jackson Gardener, International Trade Director, Alberta Agriculture, indicates that sales to Korea have been strong.. "Last year, there were $30 million of grain sales between Canada and Korea, with about 40 percent of those sales from Alberta." Direct sales to Kangwon have included rye and oats, as well as animal feeds such as canola meal. Future trade will likely include alfalfa, forage seeds, and barley.

Alberta has also sold Kangwon modest amounts of hides; and through the years, has provided considerable consulting services in livestock and pasture management. The Farm Demonstration Project (outlined in the June '84 issues of this newsletter), combining both sales of Alberta breeding stock and the consultation services of Alberta experts, clearly showed the mutual benefits in agriculture for the sister provinces.

In the future, there is potential for even greater technical cooperation and consultation support in forest management and soil studies. Further educational and technical exchanges are also being encouraged. As predicted, the long-standing shared interests in agriculture have enriched Alberta's sister relationship with Kangwon.

ALBERTA GIVES TIPS ON FARM MANAGEMENT

From the beginning of their sister relationship, Alberta and Kangwon have recognized the importance of their shared interests in agriculture. The Farm Demonstration Project is a major and longstanding program in the continuing affiliation between the provinces.

The project began in 1979, when Alberta Agriculture and the Cattle Breeders Association donated 18 head of purebred beef cattle to be crossbred with Korean native cattle on a demonstration farm near Chuncheon. According to David Clarke, International Trade Director, Alberta Agriculture, the project was designed to demonstrate the fine characteristics of Alberta beef cattle and increase the meat yield of the Korean stock. The official opening ceremonies were held in October 1979, with the Hon. Dallas Schmidt, Minister of Agriculture, representing Alberta. In 1983, the Hon. James D. Horsman, Minister of Federal and Intergovernmental Affairs visited the farm during his trip to Gangweon.

Besides the five heifers and one bull each to the Hereford, Simmental and Angus breeds that were sent to Korea, forage crop seed also was donated to the project. Terry Lee, an Alberta livestock specialist, has visited the farm annually to introduce Canadian livestock management techniques (hoof trimming, innoculation) and provided the Korean farmers with information and guidance on improvement of forage and livestock production.

The Farm Demonstration Project has been deemed a success by everyone concerned. David Clarke expresses the satisfaction of Alberta Agriculture, "We are very pleased with the results. It was an excellent way to help the Korean farmers assess and upgrade their native cattle, and it has certainly been a clear demonstration of the high quality of Alberta stock."

The sister relationship between the provinces has been strengthened by the demonstration project and agriculture has continued to be an area

of major activity. In 1981, the government of Kangweon wanted to undertake a land utilization assessment and because of the success of the earlier project in highlighting Albertan's expertise, they commissioned a study of an Alberta agricultural consulting firm, Deloitte Haskins and Sells Associates.

Mutual concerns in agriculture also have been important in the developing relationship between Kangwon National University and the University of Alberta, officially twinned in 1982. Since that time, discussions and activities have included a visit to Korea by Professor Joesph Richter, Department of Agricultural Economics. There have also been visits by Professor Ron Mucetich, Department of Pharmacy; Professor Walter Wiorth, Faculty of Education; Professor C.Y. Oh, Education; Dean R. Patterson, Education. In a future issue of Asia-Alberta Exchange, we will have a story about Dr. Richter's trip to Kangweon and Hokkaido.

Student Resource

CHINA

AN OVERVIEW OF
ALBERTA-HEILONGJIANG RELATIONS

Heilongjiang has an extensive agricultural base. It is a major grain producer and is expected to play a vital role in China's livestock development during the coming years, given the special emphasis the Chinese Government has placed on agricultural modernization. The climate and topography of Heilongjiang are similar to those of Alberta, with a frost-free season averaging 120 days.

Alberta has an agricultural cooperation agreement with Heilongjiang, stressing the areas of animal husbandry, pasture management, genetic technology and food processing. There have been a number of commercial spinoffs from this cooperation. In 1982 Heilongjiang purchased 100,000 hides, valued at approximately $5 million, from Alberta, and these sales have been of a continuing nature to the present. Since 1982, Alberta has been selling Heilongjiang some 25,000-30,000 tons of malting barley per year and these sales are expected to continue. Discussions have been carried out on a possible agreement for the sale of 200 - 500 head of dairy cattle (Holstein) per year. As a result, of the signing of an animal health agreement between the two provinces, these and other sales are expected to materialize in the near future. There exists strong potential for the sale of beef cattle, forage seed and animal feed (pre-mixes), as well as for consulting services in the area of livestock management. Further commercial opportunities are likely to arise from our agricultural cooperation program.

AGRICULTURE - "AREA OF GREATEST INTEREST FOR BOTH PROVINCES"

Agriculture is a major factor in trade relations between Canada and the People's Republic of China: Canadian wheat exports to China are currently valued at more than $700 million a year. Of that wheat, an estimated 60 per cent is grown in Alberta, placing China as Alberta's most important agricultural market.

Since the signing of the Protocol of Understanding and Friendship by Heilongjiang and Alberta in September 1981, agriculture has become a major area of mutual interest and cooperation between the two provinces.

Early in 1982, agricultural experts from Heilongjiang and Alberta exchanged visits to discuss the potential for cooperation in trade, seed exchange, and animal husbandry. At the same time, arrangements were made to export brine cured hides and malting barley from Alberta to Heilongjiang.

These visits showed that the geographic and climatic similarities of the two provinces provided a natural base for the development of the special relationship envisaged in the September 1981 protocol. Both are northern provinces, with long, hard winters and relatively short growing seasons; both have vast expanses of rangeland for cattle grazing; both have extensive crop-growing areas. Both, to a considerable degree, face the same problems in seeking to improve agricultural and livestock production.

The prospects for mutual benefit in an exchange of information and technology were apparent. The adaptation of certain Alberta methods and techniques to Heilongjiang could help improve that province's productivity; the work undertaken in Heilongjiang on plant and animal genetics is potentially useful in Alberta.

In October 1982, the departments of agriculture of the two provinces signed a sub-agreement to the September 1981 protocol. They agreed to

emphasize trade and the exchange of technology in agriculture and animal husbandry. Activities highlighted in the sub-agreement included potato production and pasture management; technological exchange to improve the cultivation of grain, oilseeds and vegetable seeds; and cooperation in the breeding of beef cattle, dairy cattle, and swine.

The sub-agreement also called for trade and the exchange of technology in the processing, packaging and distribution of meat and meat products, milk, hides and leather, beer and potatoes.

In September 1983, during a visit to Heilongjiang, the Hon. Peter Lougheed, the former Premier of Alberta, reconfirmed that "agriculture remains the area of greatest interest for both provinces, and has been the one area so far which has given Alberta identifiable trade benefits".

It was also during this visit that the Premier and Chen Leo, Governor of Heilongjiang, listed these areas where future joint activity offers good prospects of mutual benefit.

- Continuation of the crop seeds exchange;
- Exchange of technology in the breeding of beef cattle, dairy cattle, and swine;
- Exchange of experts to promote mutual understanding of agricultural marketing structures and pricing,
- Continued trade in cattle hides and malting barley from Alberta; and
- Efforts to speed up the signing of an animal health agreement between China and Canada.

Once the technical problems related to the signing of such an animal health agreement are resolved, significant commercial sales of livestock to Heilongjiang may develop.

HEILONGJUANG AND ALBERTA:
THE SIMILARITIES

The two have a great deal in common: climate, resource development, agriculture, and perhaps most significantly of all - the need to find ways of dealing with winter, in sports and recreation, as well as developing production techniques for industry and agriculture.

Many Albertans may not be familiar with Heilongjiang. Here is an introduction to our "sister" province.

Heilongjiang is the most northerly of the 21 provinces in the People's Republic of China, located in the far northeast of the country, sharing a border of approximately 1900 kilometres with the Soviet Union. While the area of this province, the sixth largest in China, is almost a third smaller than Alberta's, the population of Heilongjiang (about 34 million people) is more than 15 times greater. Heilongjiang is China's principal oil-producing province, responsible for approximately 50 per cent of that country's petroleum output. As well, it has an extensive agricultural base. It is a major grain producer (known as the grain centre of China), and grows 70 percent of China's sugarbeet crop, in addition to significant amounts of soybeans, potatoes, sunflower seeds, corn, millet, flax and tobacco. It is also expected to play a vital role in the livestock development program which is part of the Chinese government's emphasis on agricultural modernization. The relationship with out province; involving cooperation and information, is of great benefit to both provinces due to the difficulties they both encounter resulting from extreme cold and a frost-free season averaging only 120 days.

Both provinces have rolling plains and grasslands, extensive tracts of good arable land and vast forested mountains. Like Alberta, Heilongjiang has many thousand square kilometres in the north still to be reclaimed for agriculture.

The mountain regions of Heilongjiang yield almost 40 per cent of China's dressed lumber and support a major paper-making industry. As well, the province has large coal deposits.

The major cities in Heilongjiang are Harbin, the provincial capital, with a population of more than 2 million, and Jia-mu-si, Mu-dan-jiang, Qi-qi-ha-er, and Daqing, all industrial centres.

More than 300 scientific and research institutions play an important role in the province's development. Many of these institutions are attached to factories, others have done significant research in agriculture and mechanical engineering.

There are approximately five million students in elementary and middle schools in Heilongjiang. In Harbin alone, there are almost 30 universities and comparable institutions.

NEW AREAS OF AGRICULTURAL COOPERATION EXPLORED

As shared interests in agriculture are revealed through the development of the special relationships, new areas of cooperation are constantly being explored between Alberta and various regions in Asia.

A recent trip to China, Hong Kong, Jakarta, and Bangkok by Alberta Agriculture Director Bill Anderson highlights some of the many ways activities are initiated and extended.

Last spring, LeRoy Fjordbotten, minister of Alberta Agriculture received a number of requests during his trip to Heilongjiang regarding cooperation in the area of food processing. In response, Dr. Bill Ballantyne, head of the department's agriculture processing development branch, accompanied Mr. Anderson to China.

"As a technical specialist, Dr. Ballantyne could assess the overall food processing capability in Heilongjiang by touring their facilities," Mr. Anderson explained. A report is being prepared on their findings.

In addition, Mr. Anderson reported on the progress of the Qi Qi Harr Range Improvement Project, a joint range management research project with Alberta.

"The experiments conducted in 1984 were very successful. The Canadian forage seeds are growing well. Heilongjiang expressed interest in expanding the project and we will discuss the matter during our next annual visit to China."

In October, the 17th agricultural delegation to come from Heilongjiang visited Alberta dairy and beef cattle operations, poultry farms, and meat processing and slaughtering plants. As well, the six member group looked at the treating and marketing of forage seeds, and toured the Leduc swine breeding centre. They also were interested in learning how

information on agricultural technology is disseminated in our province.

There is a continuing exchange of people and information between the provinces concerning agriculture, and Mr. Anderson expresses the satisfaction of Alberta Agriculture with the relationship.

"We regard this as an interesting market. We are achieving a great deal in understanding the needs, constraints, and opportunities for mutually beneficial agricultural activities with China. It is a very active relationship."

Mr. Anderson's trip to Hong Kong, Jakarta and Bangkok demonstrates the expansion of Alberta's activities into other regions of Asia.

"In most of the countries of Southeast Asia, there are large and sophisticated hog and poultry operations. They are dependent on imported soybean meal as a protein supplement for feed. In November, a western Canadian canola mission travelled to Southeast Asia and I went earlier to get a feel for the market there," he explains.

He sees potential. "The market looks good. There was an enthusiastic response to the introduction of canola as a substitute or complement to soy meal for the hog and poultry operations."

This response could mean considerable trade. According to Mr. Anderson's information, one operation in Thailand imported more than 100,000 tonnes of soy meal last year. At $200 per tonne, that is a $20 million sale to just on user. Mr. Anderson suggests that benefits Alberta producers, "They could repeat the successes they have already achieved in Korea."

COMPARATIVE STATISTICS

	Alberta Census Statistics 1981	Alberta as % of Prairie Provinces	Canada
Total Population . . . no.	2,237,724	52.9	9.2
Farm Population . . . . no.	195,284	40.6	18.1
Number of Farms . . . . no.	58,056	37.5	18.2
Total Land Area . . . . ac.	157,710,720	36.3	6.9
Occupied Farm Land . . ac.	47,218,170	36.3	29.0
Occupied as % of Total Land . . . . . ac.	29.9	--	--
Improved Land . . . . . ac.	30,951,142	33.2	27.2
Unimproved Land . . . . ac.	16,267,083	44.0	33.3

	CROP AREA 1984 (Principal Crops Only)		
All Wheat . . . . . ac.	7,260,000	22.0	22.3
Oats for Grain . . . . ac.	1,200,000	45.8	34.5
Barley for Grain . . . ac.	5,150,000	50.7	45.8
Canola/Rapeseed . . . . ac.	2,900,000	40.6	39.2
Tame Hay . . . . . ac.	3,900,000	55.7	29.4
Summerfallow . . . . . ac.	4,700,000	22.8	22.8

Source: Agriculture Statistics Yearbook, 1984. Alberta Agriculture Agdex 853-10

ALBERTA'S CROP PRODUCTION IN A CANADIAN CONTEXT

WHEAT: The prairie provinces have rightfully been designated to bread basket of Canada, producing over 95% of Canadian wheat. About 24% of all Canadian wheat is produced in Alberta and 59% in Saskatchewan. The share of wheat production between provinces has remained fairly constant over the years.

BARLEY: The prairie provinces account for over 90% of Canadian barley production. About half of Canada's barley is produced in Alberta. Over the past ten year, Alberta's share of barley production has increased from 47% to 50%, mainly at the expense of Ontario and Saskatchewan.

Barley production in western Canada is the base upon which the western livestock feeding industry has developed. Production in Alberta has been constantly increasing with less annual variability than noted in Saskatchewan.

OATS: In total dollar value, oats is not an important crop to Alberta or Canada. Although acres seeded have been declining, increases in yields are maintaining stable production levels, more so for Alberta than Canada.

Alberta has increased its share of oats production in Canada from about 32% to 43% in the past ten years.

The prairie provinces presently produce approximately 84% of the oats in Canada.

OILSEEDS: The main oilseed crops are grown in Alberta; canola and flaxseed. Flax is declining in importance as a crop in Alberta, while canola is increasing in importance to both Alberta and Canada.

The prairie provinces produce more than 98% of the canola in Canada, with Alberta accounting for 40% to 42%.

Canola yields have been fairly consistent with an upward trend over the years. However, the acreage seeded varies considerably from year to year. A farmer's decision to grow canola hinges upon markets for other grains, spring climatic factors and price relationships. Canola has provided the prairie farmer with an important alternative to wheat and coarse grains. For this reason it has been called the "Cinderella" crop of western Canada. Farm cash receipts for canola in Alberta reached a high of about $400 million, or 19% of total cash receipts from the sale of crops in 1986.

TAME HAY: Alberta farmers produce about 25% of the tame hay in Canada and their annual share of Canadian production is increasing slightly.

Although hay production is not significant as a cash crop, it is extremely important to Alberta farmers in supporting livestock.

Average yields of hay are about 15% lower in Alberta as compared to the Canadian average. This probably relates to the more intensive farming practices and higher precipitation rates in Central and Eastern Canada.

SUMMARY

Alberta is a major producer of field crops in Canada. The accompanying table gives Alberta production as a percentage of total Canadian production.

CROP	Alberta Production as a % of Canadian Production
Wheat	23
Barley	50
Oats	43
Canola	43
Potatoes	9
Honey	31
Sugar Beets	63

This Land of Alberta - Alberta Agriculture

LIVESTOCK

CATTLE: Ranching began in Alberta about 100 years ago. It is an industry which has experienced many ups and downs. For the past 25 years there have been three major "cattle cycles" in Canada.

In the 1950's and early 1960's Canadian cattle inventories increased steadily from about 9 million to 12 million head. In the early 1960's Alberta overtook Ontario as the province with the largest beef herd. The large wheat sales to Russia in the early to mid 1960's and their subsequent termination resulted in an increase in cattle numbers due to excessive grain inventories. These large grain inventories in late 1960 spurred another expansionary phase in the cattle inventory. In this latest cycle, the advent of the modern commercial feedlot was seen. Low grain prices in 1985-86 have also combined with improved cattle prices to encourage an increase in cattle populations.

Ontario's producers increased their cow herds and their feeding capacity along their growing population. This in a large part, was due to the development of hybrid corn varieties that revolutionized Ontario's crop production and provided feed at low cost.

With improved technology such as boxed beef, and with a hope for a change in tariff rates, transportation and quotas, the future of Alberta's livestock industry appears bright. For the last 25 years, Alberta's share of Canadian Cattle slaughtered increased from 30% to 36%. In the mid 1980's increasing numbers of slaughter cattle are exported live to the United States, lowering Alberta's slaughter to below 40% of the Canadian total.

Quality of Alberta meat is well above the Canadian average with 74% of the animals slaughtered being grades as A-1,2. Beef processing is the province's largest food processing industry.

One third of the live cattle in Canada are on Alberta farms. Although Alberta may expand its production base relative to the rest of Canada, future growth patterns will still be very dependent on the ratio of cattle prices to feed-grain prices.

HOGS: Hog production in Canada is also affected by cycles. The hog production cycle generally peaks every three to five years.

Western Canada in general, and Alberta in particular, maintains a hog industry based primarily on barley and other grains. When the price and movement of barley is such that a greater return on the barley can be achieved by producing hogs, this is done.

Eastern Canada hog cycles are not as pronounced as in the west. This is mainly due to a more capital-intensive method of agricultural production and a smaller land base per farm.

Alberta has sought to develop market alternatives by developing export contracts for hogs. Although this presented hog producers with an excellent form of price security, production still declined from marketing of over two million hogs in 1971 to about one million in 1976, and has since increased to 1.5 million in 1986.

ALBERTA'S DAIRY INDUSTRY - 1962 TO 1987

In the past 25 years, Alberta's primary dairy industry has changed from thousands of small production units to a concentration in the hands of fewer, more efficient producers with large herds. Per capita consumption of dairy production has dropped 21% in the past 25 years. Alberta is self-sufficient in production of fluid milk, but has shifted from having a surplus of butter and other dairy products to being a net importer. Alberta's share of factory production has declined to 78% of consumption levels due to the inability of the industry to expand production rapidly enough to meet domestic requirements.

POULTRY

The improvements and developments in commercial broiler and egg production technology in the 1950's revolutionized the industry. Per capita consumption of poultry has continued to increase over the last 25 years. The fast-food outlets which sell fried chicken have contributed to our increased consumption.

To offset price variables, marketing boards were formed to stabilize supply.

Turkey production in Alberta is about equal to consumption.

The increase consumption of chicken indicates an expanding market for broiler producers. Alberta now produces approximately 9% of the Canadian broilers.

EGGS

The production of eggs has also undergone a revolution in technology over the past 25 years, with most small scale producers being forced out of the business. Today eggs and poultry meat account for about 3.5% of total Alberta farm receipts, i.e., over $135 million as opposed to $20 million worth in 1951.

Egg consumption is declining all over Canada, and even with 12% lower number of birds, egg production has remained constant in Alberta in 1986. The Canadian Egg Marketing Agency, established in mid-1975, reduced domestic supplies of eggs to marketable level, and has improved the returns to farmers.

HONEY

Alberta produces about 10 million kg (22 million pounds) of honey each year. This is around 31% of Canada's total production. About one-third of Alberta's honey is exported, chiefly to the United States, and in lesser quantities to Japan and Germany. The value of this honey in 1986 was estimated to be $15 million.

There are opportunities for expansion in the north central part of the province where long daylight hours make honey production feasible. The pollinating capacity of bees has not been fully exploited in that area in relation to seed production, especially of clover, so further expansion is desirable and practical.

The following tables indicate the size of the Alberta industry:

BEEKEEPERS AND COLONIES

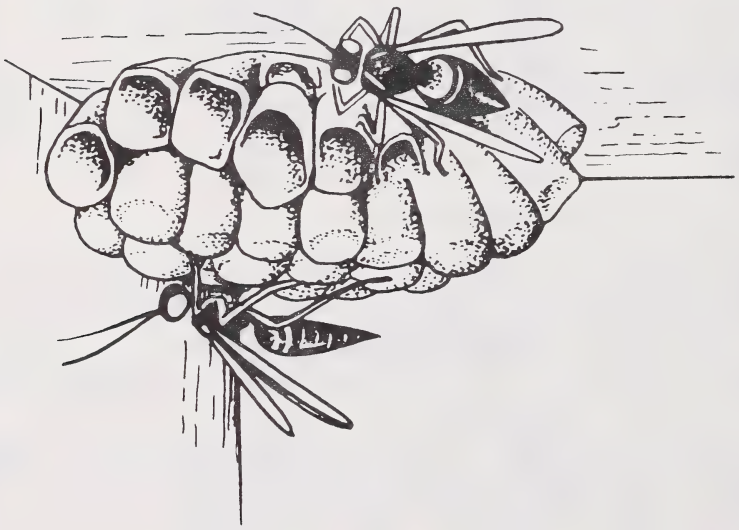
YEAR	BEEKEEPERS	COLONIES (Number)	HIVES PER APIARY
1977	1,800	165,000	92
1978	1,800	160,000	89
1979	1,700	150,000	88
1980	1,800	160,000	89
1981	1,700	170,000	100
1982	1,650	174,000	105
1983	1,610	172,000	107
1984	1,600	180,000	112
1985	1,700	170,000	100
1986	1,700	190,000	112

HONEY PRODUCTION AND PRICE

YEAR	YIELD PER HIVE (kg)	TOTAL PRODUCTION (tonnes)	PRICE ($/kg)
1977	59	9,730	0.95
1978	57	9,072	1.12
1979	68	10,251	1.26
1980	64	10,306	1.28
1981	62	10,478	1.42
1982	47	8,210	1.37
1983	66	11,385	1.32
1984	70	12,542	1.07
1095	49	8,392	1.24
1986	57	10,886	1.32

HONEY AND BEESWAX VALUE

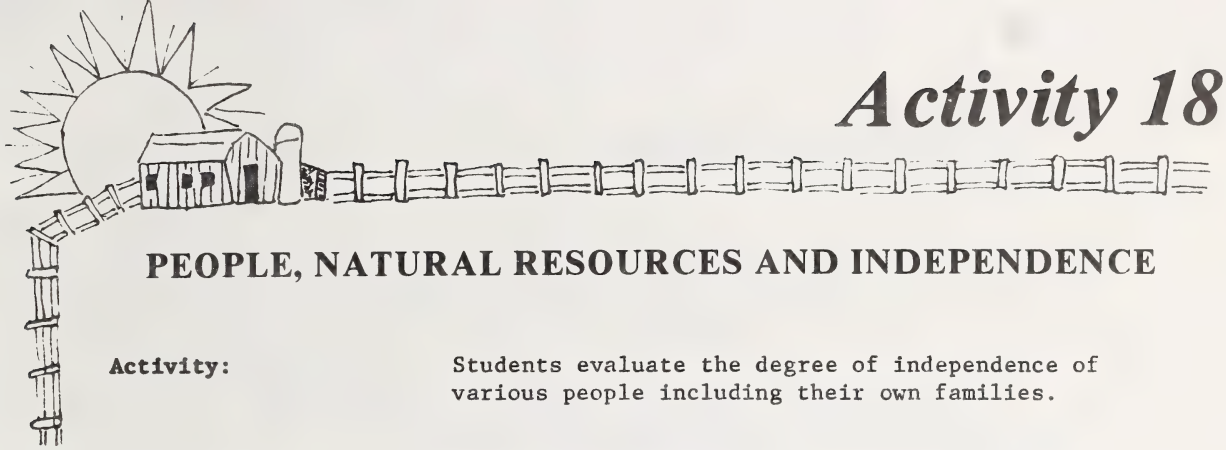
YEAR	HONEY	HONEY AND WAX
	(Dollars)	
1977	9,224,000	9,712,000
1978	10,200,000	10,641,000
1979	12,882,000	13,368,000
1980	13,166,000	14,579,000
1981	14,934,000	15,339,000
1982	11,265,000	11,506,000
1983	15,029,000	15,300,000
1984	13,410,250	13,699,250
1985	10,415,500	10,644,900
1986	14,400,000	14,595,000



"Hello Alberta" This hog lives in the research station in Gangweon.

A delegation from Asia visits Olds Agricultural College.

Mr. Anderson from
Alberta Agriculture
visits a co-operation
project in China.



Activity 18

PEOPLE, NATURAL RESOURCES AND INDEPENDENCE

Activity: Students evaluate the degree of independence of various people including their own families.

Subject Area: Social Studies - Grade 4 or Grade 6.

Curriculum Direction: How people in earlier times met their basic needs.

Major Concept: Independence is related to access to natural resources.

Lesson Concepts: Some families are more independent than others.

Independence is greater when a person or group has access to natural resources.

Purpose: To show students how interdependent our families are within themselves and in relation to other families and groups.

To evaluate the level of independence of selected family units.

To compare independence and interdependence.

To illustrate the link between independence and natural resources.

Materials Required: Supplied in this lesson.

Time Required: 2 class periods.

BACKGROUND — to the teacher

Definitions:

Independence
- Defined as not requiring or relying on others.
- Basic needs are met without the assistance of others.

Interdependence
- Defined as having mutual dependence.
- To depend on one another.
- Through cooperation and effort, all participants benefit.

Concepts:

Concept 1: The term independence can be used to refer to an individual, or a group of individuals who function as a unit. In this exercise, we will be looking at independence in terms of families.

Interdependence. A good example of interdependence is how family members work together towards a mutual gain.

Concept 2: The independent unit must have access to natural resources. For example, in order to produce ones own food one must have access to some land or soil. Fuel may come from trees, coal or oil products. These natural resources are used to meet our basic needs.

Concept 3: Man has two very basic needs: food and shelter. Shelter includes such things as the dwelling, clothes, and fuel as required.

Concept 4: An independent family unit can supply their basic needs without assistance from others.

Concept 5: True independence is rare, but there are families who are more independent than others. In this exercise, we will decide if the family is more independent or more interdependent.

PROCEDURE

Part 1

Introduction:

1. Review the introduction with the class. Some questions to assure understanding may be:

Independence and Natural Resources:

- Can you suggest groups other than families that may be evaluated as to their independence or interdependence. Provinces and countries may be examples.

- How are natural resources related to independence? Can a province which has limited natural resources be independent?

Part 2

Making Comparisons:

2. In the first part of the exercise, we will look at four families. The first two are Indian and the second two are farm families. The children will see how life styles and outside influences make these families more independent or interdependent.

Part 3

Evaluating:

3. In the second part of this exercise, the children will look at the Independence Chart and decide how independent or interdependent their family is.

4. Divide the class into groups. Have each group choose a family they would like to analyse.

   Have each group prepare a profile of their family?
   - members
   - where they live (urban or rural)
   - occupation
   - activities
   - Does the family own any natural resource?

   Have each group assess their family on the Independence Chart.

Conclusion:

5. Have each group present their family to the class giving a description of the family and their evaluation as to how independent the family is.

6. Ask each group to explain how their family might be able to become more independent.

7. What conclusions can we draw from the lesson?

   a) It is nearly impossible to be truly independent.
   b) The most independent families have their own raw materials and supply their own basic needs.
   c) Some families are more independent than others.
   d) There are advantages to being independent, but there are also advantages to being interdependent.

FOR DISCUSSION

1. In the last 400 years, people in Alberta have been both independent and interdependent. In your opinion, will Albertans be more or less independent in the future?

2. What are some of the advantages to independence? Interdependence?

RELATED ACTIVITIES

1. Try to make your class totally independent for a day.

2. As an alternative activity, students may wish to rate their own families on the Independence Chart and see whether their own families are more or less independent relative to the rest of the class.

INDEPENDENCE CHART

	Always	Sometimes	Never
1. Grows own food in a garden.			
2. Built own home from resources on your land.			
3. Supply own Fuels from your own land (fire wood, coal).			
4. Make own clothes.			
5. Work for yourself (not employed by another).			

Score 3 for each answer under always
2 for each answer under sometimes
1 for each answer under never

The higher the score, the more independent your family is in providing their own basic needs.

What natural resources does your family own?

What natural resources does your family use?

Student Resource

Family A Indians (year 1600) Alberta plains Indians were able to meet their basic needs from the main resource of buffalo. A family could exist, independent of other families, if they chose to. Most Indian families lived in association with other families in tribes. What would be the advantage of this association? (Protection, more division of labour, social contact.)

Family B Indians (year 1800) Alberta plains Indians were trading extensively with White traders by this time. Families used weapons, utensils and beads received in trade from the White traders. They were no longer truly independent. The trade associations made the Whites and the Indians more interdependent. The Indians of 1800 were not as independent as the Indians of 1600.

Family C A pioneer farm family in the year 1906 may have been mostly independent. They grew most of their own food, built their own home, chopped wood from their land for fuel and made their own clothes. The animals they used to work were fed from the products raised on the farm. This pioneer family may not have been quite as independent as the Indians, but they would still be rated as being independent by today's standards.

Family D A modern farm family who raises grain only is almost entirely interdependent. This family gets the materials for their shelter from a lumber company. They wear clothes bought in a store and heat their homes with natural gas supplied by a utilities company. The grain they raise is sold. They receive money for their crop and use that money to buy the things they need. This family is very inter-dependent.

(Left)

Prior to 1600 a.d. Plains Indians were very independent. Their needs being met almost completely by buffalo.

(Below)

After 1600 a.d. Indians traded actively with European traders. This made them more interdependent.

Blackfoot Indian Camp. Fort MacLeod Area 1902, A11095, Provincial Archives of Alberta.

Trading posts were centers of exchange of goods and services.

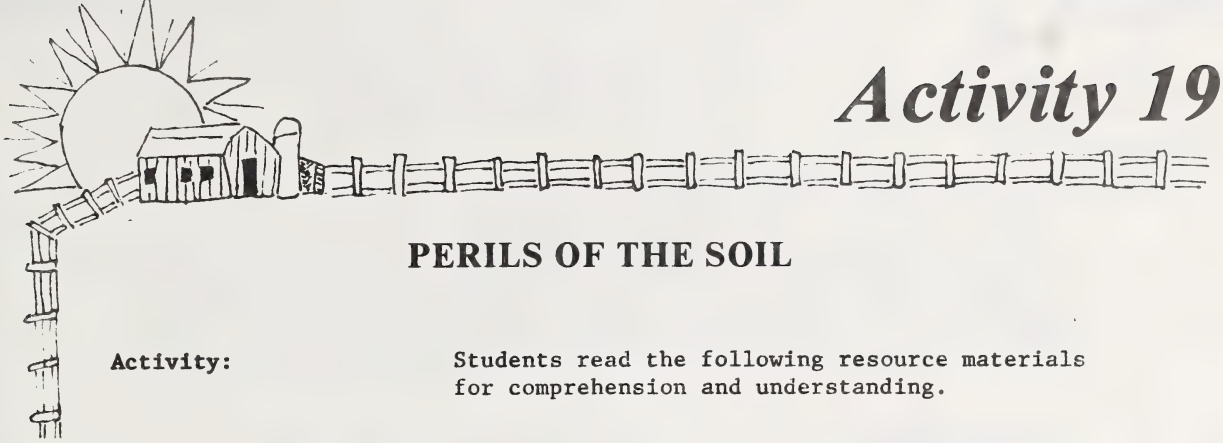
David Lambert Trading Post 1883. P3455.
Provincial Archives of Alberta.

Trips to town were few and far between.
Whyte Avenue, Edmonton. 1901. A 2263.
Provincial Archives of Alberta.

This busy farm yard could meet most of the family's needs.
A characteristic Western Farm Yard. 1890 - B 720.
Provincial Archives of Alberta.

Alberta farmers may specialize in a one crop operation.
These families are very interdependent.

A feed lot operator such as this may buy all of the feed for the animals.
A custom feed lot fattens animals for several owners.



Activity 19

PERILS OF THE SOIL

Activity: Students read the following resource materials for comprehension and understanding.

Subject Area: Language Arts and Science.

Curriculum Direction: Reading for comprehension.
Conservation of a natural resource - the soil.

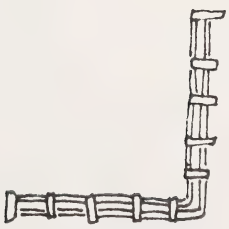
Major Concept: Soil erosion is a problem shared by all people who like to eat.

Lesson Concepts: Soil is a valuable natural resource which provides a home for wildlife and food for both animals and people. This resource deserves our protection against erosion by wind and water or loss of fertility through soil salinization.

Purpose: To present information on soils and soil conservation in an entertaining format.

Materials Required: Supplied in this lesson.

Time Required: 1 - 2 class periods.



BACKGROUND — to the teacher

Topics in Science are frequently presented in a factual, but dry and uninteresting format. The following reading resource materials were prepared by the staff at the Soils Conservation Branch of Alberta Agriculture, in a manner which appeals to young imaginations, while still providing useful information on soils and soil conservation.

PROCEDURE

1. Provide students with individual copies of the resource reading material provided.

2. After reading each part, divide the class into 3 groups and give each groups one of the Perils of the Soil Worksheet.

Conclusion:

3. Display the graphics and questions and answers in a collage format.

FOR DISCUSSION

1. Discuss some of the questions in the exercise.

2. Do urban and rural see soil problems differently?

3. What is the most critical soil problem in your area?

RELATED ACTIVITIES

1. Make a skit out of any of the three stories and perform it for another class.

Worksheet

WIND EROSION

1. Draw the underground home of Galileo, the gopher. Show the following on your drawing..

   - 2 entrances and underground living quarters
   - food supply
   - layers of the soil
   - surface vegetation
   - wind direction.

2. What is preventing the soil from blowing away? Write your answer at the bottom of your picture.

WATER EROSION

1. What is responsible for holding undisturbed natural soils in place?

2. What may occur when natural vegetation is removed?

3. What can we do to help Mother Nature and prevent soil from being washed away by surface water?

4. Do a diagram of how water causes soil erosion and how it may be prevented.

SALINITY

Answer three of the following questions:

1. What was the riddle that Detective Sam was asked to solve?

2. List the "evidence" that Detective Sam used to identify the culprit.

3. Why was the land only poisoned in certain areas? What was poisoning the land? Where does it come from?

4. What are the sources of water for the farmers which are mentioned in this poem?

5. Irrigation is often used when farming in dry areas. How can the farmer slow the process of salt buildup in his soil by using proper irrigation practices?

   (Ans. Don't over water. Apply only what your crop needs.)

6. Make a poster type picture that would be useful in alerting people to the salinity problem.

Student Resource

Soil Conservation Lesson

Part I - Wind Erosion

Hi! I'm Galileo. Ya, a gopher. I was named after that famous guy, Galileo who discovered things about the sun, moon and planets. I've been making some discoveries myself, not about things far away, but right here, under your feet. You see, I live in the ground and I watch pretty close to what goes on. Come look in my burrow.

You see, when I go down into my home, I pass through a dark coloured layer of soil on the top of the ground. Guess what that's called? Topsoil! Right! That dark layer is full of roots, old stems and other plant parts. If you could see what happens there, you'd be surprised. Millions of tiny bugs, called microorganisms, live in each teaspoon full of topsoil. They eat the dead and decaying plants. Yech, Not me! I like young tender shoots of grass, don't you? Anyway, these "micro-bugs" eat this dead stuff, the plant food is released into the soil. Other living plants can then use these plant foods to help them grow. The leftover stuff that the "micro-bugs" can't eat gives the soil its dark colour. The leftover stuff is called "humus". Humus works like glue to stick sand, clay and silt particles together. Soils with lots of humus have crumbs because of the humus. Not bread crumbs, of course. Soil crumbs are made of sand, silt and clay particles stuck together by humus. Soils with these soil crumbs and with plant food in them grow good crops of wheat, corn, potatoes, etc. Soils without soil crumbs or plant food can't grow good crops.

Now let's go down my burrow a little further. Watch your head! See, the next layer in the soil is not a dark colour. It's kind of light brown; kind of sandy coloured. Does it bother you being underground down here? It's like a subway, sort of. The soil down here is called subsoil, just like subway. Subsoil doesn't have as many "micro-bugs" or decaying plants as topsoil. What does that mean about plant food and soil crumbs in the subsoil? Right. There won't be as many crumbs or as

much plant food in the subsoil. How well would crops grow on just subsoil? Not very well. So, to keep those yummy grass shoots (and carrots, peas, etc.) growing, the topsoil must stay on the field.

Do you think that all the topsoil on a field could disappear? Yup, it can. How? Just poke your head out of my burrow until your eyes are just level with the ground. Feel anything? Ya, the wind is blowing your hair. Is anything getting in your eyes? There's sand getting in your eyes, is there? When the wind blows hard, the topsoil can be blown off the field: not all the topsoil in one day, but a little bit at a time. That's why you're getting sand in your eyes. The topsoil is blowing away. If nothing stops the topsoil from blowing away, all that will be left is subsoil and then . . . you know what will happen. I heard two humans bigger than you talking about the topsoil blowing away. They called it "wind erosion" when the wind blew strongly across the field and took the soil away.

Now come down my burrow and out my other door. Yes, I have two doors to my house too! Now stick your head up out of this hole with your eyes just at ground level. Notice anything different? You say there isn't any soil blowing in your eyes? Is the wind still blowing? See anything that would stop the wind from blowing the topsoil away? Right! There's grass all around this hole and the grass keeps the soil from blowing away. The other hole was in a bare field. Last fall the other spot wasn't so bad either. When the farmer harvested his crop, he left his stubble up. What's stubble? Stubble is the part of the crop that is left standing in the field after harvest. The field had wheat on it last year. Big machines came and cut the top part of the wheat off, leaving the bottom part of the wheat stems still standing. The soil was covered with wheat stems, or stubble. The stubble kept the soil from blowing away. Then more big machines came to plow up the field. I had to duck or get a crew cut. The plow filled in my burrow a little so I dug it out. When I stuck my head up out of my hole, I got some grit in my teeth and sand in my eyes. Wind erosion had started.

Whenever the weeds started to get tall in the field, in would come the plows again. Each time they came, more and more stubble would disappear, and I'd get more and more grit in my teeth. The wind erosion got worse as more of the stubble was plowed under. Guess which door I use the most; the one in the bare field, or the one in the grass? I wonder how many years it will be before the topsoil is all blown away? Maybe the farmer won't be able to grow any more wheat. Maybe I should call for Super Gopher to come pick up the plow and carry it off into space? Maybe the farmer will learn to keep his stubble up.

Student Resource

Soil Conservation Lesson

Part II - Water Erosion

Only on rare occasions have I let any humans come visit me. Not many are as good at swimming as you. Is there room in my lodge for you to sit up? Us beavers aren't as tall as you kids, you know. Oh, I forgot. My name is Bucky, Bucky the Beaver. And what was your name? I hear your teacher let you come here today to listen to my stories about water erosion. I get up to my head in my work sometime but there's always time to talk.

You see, I was working on a dam one day. I live in this beautiful wood where the trees grow tall, the grass green and the water clear. I go up the stream and chew down small trees with my long teeth. I haul the trees to the stream and float them down to my dam. I stick small pieces of the tree here and there like weaving a cloth. A little mud here and there along with the trees keeps the water from all running away at the same time. Even when there's a bit of a flood, my dam holds some of the water and lets it out slowly. You know what would happen if my dam didn't stop the flood? Mud, sticks and rocks would all get carried down the stream. You know, fish can be killed by muddy water, streambanks washed away by rushing water, and houses flooded by all the water coming at once.

That reminds me of what happened upstream of here one time. I had gone upstream to find me another tree one day. There I saw a big machine, knocking over trees and bushes. Soon other machines came to plow up the ground and seed it. I was worried. Without any trees and bushes on the ground, what would hold the water on the field? You see, each tree, each bush is a little dam, like my beaver dam. They hold the water up and let it run a little at a time. With all the plants gone,

what would stop the water from running over the field, washing mud and rocks into my stream? I was relieved to see new plants start to grow, and lots of them. The plants were like grass. I found out it was wheat growing on the field. When the rains came, the wheat stopped the water from washing away the soil. My stream stayed clear.

Then fall came along with more machines coming to the field. The wheat was harvested and then the field was plowed. The plowing buried the wheat stubble. No stubble was left to keep the soil in place. I dreaded the next spring.

The snow piled up during the winter. In the spring, the hot sun melted the snow and then it rained too. All kinds of water, snow melt and rain water, ran off the field down into the stream. The fast running water ran through the field like a river. The topsoil was carried out of the field and into the stream. You should have seen my lodge; all full of mud. Right where you're sitting had a coat about as thick as my tail. You should have seen the field! There, where a smooth field was before, a big ditch and lots of little ditches forked through the field. I heard the farmer say something about losing his topsoil would make it harder to grow wheat, and the ditch would stop his machines from crossing the field. And then he said something about being worse next year. I thought I'd have to move if that muddy water was going to come each spring.

A few days after the big ditch was made by the water, some new machines came to the field. I worried as I watched, and then with amazement I saw one machine start to smooth out the sides of the ditch. Soon the ditch didn't look like a ditch; it was shaped like a huge smile. The machines could even drive across the ditch without going BUMP! Another machine came and planted seeds in the ditch. In a couple of weeks when I came back, there was grass growing all over the smooth ditch.

I heard a man talking to the farmer telling him that the grassed waterway would carry the water next year. So that was what the smooth, grassy ditch was called: a grassed waterway. I was relieved when he said there would be no erosion of soil into my stream by next year's runoff water. The man told the farmer that stubble from his crop would hold the water in place. We could have told him that: just like my beaver dam. Right? The farmer said he would try and trap as much water on his field as he could. He would try his best to keep his crop stubble standing up to stop the water from eroding his soil. I could have slapped my tail for joy. You kids jump for joy but us beavers slap our tails.

As long as my stream stays clear, you'll be able to find me here. You're welcome any time. If you see the farmer, remind him, for me, to keep his stubble up.

Student Resource

Soil Conservation Lesson

Part III - Salinity

When Detective Sam
Was assigned this case
He was the King of conclusions.
You might say "an Ace".
He could solve any riddle
He could find, and be found,
But he almost lost his boots
Uncovering puzzles in the ground.

Some farmers came to Sam
To get help one day.
Said "Sam, you're the man
Who can save our pay!
Got a tricky old villain
Who is poisoning the land.
Better catch him quick
Before everything is sand."

So Sam the detective,
Headed right to work.
Got a brand new shovel
For diggin' in the dirt.
Headed for those hills
Where the worried farmers lived;
Found a spot that was poisoned
And he began to dig.

Well, Sam then discovered
Underneath the Kochia weeds
There were specks of white

Just about the size of beads.
Every time he picked one up
It would crumble in his hand;
Then he got a worried look
Was he poisoned like the land?

Then looking at the poison
That was sitting in his hand
Came a startling thought -
"What was poisoning this land?
That darn old villain
That was killing farmers' wheat
Was nothing but some salt
Like the stuff that Sam would eat."

So he took a pinch of white stuff
And he sprinkled it around,
On that luscious ripe tomato
That was sitting on the ground.
Then Sam called the farmers
To share discoveries
That the land wasn't poisoned;
It had salinity.

The farmers were delighted
With what Sam had done
But they wouldn't pay him yet,
Not until they know how come
The salt congregated
In certain spots, not all.
This job was a hard one
It might even take 'til fall.

So Sam started pacing
With his mind in a stew
And he walked in the field
Where only white salt grew
Then he started slowly sinking
In the mud up to his knees.
"I think I've got the answer
Will you pull me out please?"

So the farmers rescued Sam
From sinking in the ground
And they listened all with awe
As he told them what he'd found.
"Well the reason that this lonely spot
Can have salinity
Is all the extra water
That's around but you can't see."

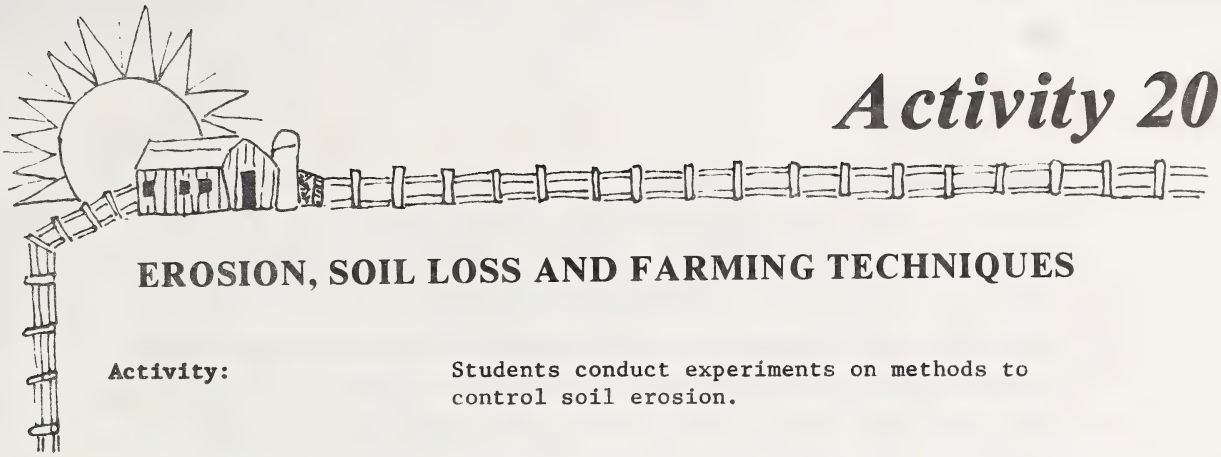
The farmer's heads were shaking
Was it true what they had heard
That the water was all salty?
Not a farmer spoke a word
For water here was precious
Every drop that could be found
Was used to grow the crops
That were seeded in this ground.

Then the farmers started thinking
"Bout the piles and piles of snow
That collected in the roadbeds
And the ponds where willows grow
And the rains that came in torrents
Nearly every seventh year
And the summerfallowed hill tops
That collected rain so dear.

So maybe extra water
Could be moving underground
To reappear some other place
Like ones that Sam had found
And carry with it slowly
All the salt from in the earth.
Depositing its salty load
Destroying land's true worth.

For salty land can't grow the crops
That all the people need
For food and fibre, oil and flour
And hog and cattle feed.
Now all the farmers' said "Hurray
I think that Sam's unleased
A wealth of knowledge to employ
A way to stop this beast."

If you were a farmer
Who has salinity
That was killing out your crop
In some locality.
What clues has Sam discovered
Yes, those ones, the very same,
That you could make a strategy
And all your land reclaim?



Activity 20

EROSION, SOIL LOSS AND FARMING TECHNIQUES

Activity: Students conduct experiments on methods to control soil erosion.

Subject Area: Science.

Curriculum Direction: Earth, Space, Time.
Wind and Water.
Soil and soil erosion.

Major Concept: Cause and control of soil erosion.

Lesson Concept: Soil erosion occurs through the action of wind and water. Prevention of soil erosion is an important part of conservation of our agriculutral lands.

Purpose: To demonstrate the mechanisms by which soil is eroded.

To explore ways in which soil erosion is prevented in agriculture.

To present the effects of soil erosion in a variety of ways for identification by students.

Materials Required:
2 cardboard boxes (16" x 12" x 4" deep).
Plastic lining for boxes.
2 pieces of tin (approximately 1½" x 3").
2 - 2 litre water sprinklers.
2 - pieces of wood (1" x 1" x 12").
Piece of sod (16" x 12").

Time Required: 2 - 3 class periods.

BACKGROUND — to the teacher

THE IMPORTANCE OF CONSERVING OUR VALUABLE TOPSOIL

The Value of Topsoil

Have you ever stopped to notice the rich, productive topsoil in your garden, flowerbed or in the farmer's fields? This layer is often very thin, only 5 or 6 inches deep. But it is very special and forms that basis for all of our agricultural production. Why is topsoil so special? Topsoil is an ideal material for germinating seeds, establishing seedlings, and producing high yields. It can be packed to make good contact with the seed, yet remain loose enough to allow the seed to swell and sprout and emerge upward. It allows water to infiltrate, and retains that water for plant use, yet permits drainage of excess water. It anchors plants, yet does not restrict root growth. It continually releases plant nutrients, yet is usually free of chemicals that cause toxicity, salinity or nutritional problems. The loss of topsoil is therefore a major concern.

Wind and water erosion are agents for widespread topsoil loss. Erosion reduced productivity and land value, while increasing fertilizer input requirements. A depth of soil and thickness of a dime covering an acre weighs about 7 tons. In some fields, in 1984 and 1985, where an inch of topsoil was lost to wind erosion, about 150 tons of soil were lost per acre. This represents a loss of plant nutrients (nitrogen and phosphorous) worth more than $300 per care.

In fact, only a portion of the topsoil needs to be removed to reduce a soil's productivity level. From studies in Alberta, we know that wheat yields can decline about 3 to 4 bushels per acre for each inch of topsoil removed. Saving an inch and a half of topsoil would be like finding a $20 bill on each acre of land year after year. That would be the additional benefit with no additional input required for producing the crop.

Wind Erosion

Thousands of tons of valuable topsoil are lost each year by erosion. Wind erosion is particularly serious in southern Alberta. High winds sweeping across dry, pulverized, unprotected soil surfaces dislodge the fine soil particles. These particles, in turn, dislodge other particles until whole fields begin to drift. The fine, most fertile, particles including the soil humus, are blowing away in large dust clouds and lost from the fields. The infertile, larger sandy particles, pile up along fencelines and in ditches. A rule of thumb is that, if we can see any soil drifting, we are losing it faster than it is being formed. Therefore, if the drifting continues at that rate, our soils will soon be completely depleted.

Water Erosion

Water erosion is also a serious problem throughout Alberta. Soil losses occur during snowmelt in the springtime and during intense summer rainstorms. The nature of the slope is one important factor. Steep slopes allow rainfall to increase in velocity and longer slopes allow more water to accumulate; both of which add to the destructive erosive power of the runoff water. The valuable nutrient-rich topsoil is washed off the field and into the ditches or into water courses where it eventually pollutes rivers and silts in dams. Common signs of water erosion include gulleys and smaller rills. These are often seen on bare fields after a rainfall. Some of the worst erosion, sheet erosion, is more difficult to see because only a thin layer of soil is removed from the field each time. Each event adds up in the long run, however, and more soil is lost than can be naturally formed to replace it.

Preventing Erosion

Fortunately, most erosion can be controlled by using good management practices. Keeping our soils covered will prevent most of the erosion problems. Following the "Dirty Thirties", trash cover farming was found to be an effective means of controlling wind erosion. This meant that after a crop was harvested, enough straw and residue was left on the field to protect it until the next crop was seeded.

The same practice is also effective in controlling water erosion.

Lands that are most prone to wind erosion or water erosion are better left with a grass cover. Such lands might include very sandy soils or very steep slopes. The roots of the grass bind the soil particles together and form a protective mat. These areas might be best used for hay crops or pasture and not for cultivation.

PROCEDURE

Experiment I - The Importance of Grass Cover in Preventing Soil Loss[1]

Introduction: Unprotected soil in backyards and vacant lots, on farms, at construction sites, and in other places washes away if water from rainstorms or snowmelt runs over the surface. Plants of many kinds -- cereal crops, grasses, shrubs, and trees -- help hold the soil in place. Thus, runoff does not carry silt and sediment to the rivers and reservoirs from which people get their water for home and industry.

Preparation:

1. You will need two small boxes about 16 inches long, 12 inches wide and 4 inches deep. (These boxes can be used for several activities so they are worth making and keeping on hand.) Make them watertight by lining them with plastic material, tin or tar paper. At one end of each box cut a V-notch 1 to 1½ inches deep and fit with a tin spout to draw runoff water into a container (see diagram A). You will also need 2 flower sprinklers; at least a quart in size (half gallon is better); 2 half gallon wide-mouth fruit jars; and 2 sticks of wood about 1 inch thick.

2. Cut a piece of sod from a pasture, lawn, fence row, or the like, to fit one of the boxes. Trim the grass with scissors so that it is not more than an inch high. This makes it easier to handle. Fill the other box with soil from the same place -- no grass, just soils, but do not try to pick a very poor soil. The idea is to have the same kind of soil in the boxes, one with grass, the other bare.

3. Set the boxes on a table so that the spouts extend over the edge. Place the sticks under the other end to give them slope. Put the empty fruit jars on stools placed beneath the spouts. Fill the two sprinklers with water and sprinkle the water on both boxes at the same time. Pour steadily and at the same rate for both boxes. Hold the sprinklers the same height above the boxes. About a foot will be satisfactory, although you can get various results with different heights.

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1. Adapted from "Teaching Soil and Water Conservation - A Classroom and Field Guide", U.S.D.A. Soil Conservation Service, PA.341.1970

Set up for Experiment I: Cover Prevents Erosion.

4. Record your observations on the amount and condition of the water reaching the jar in both cases.

Observation: You will find that the water will rush off the bare soils into the fruit jar, taking soil with it. The flow sill stop soon, but the jar will contain muddy water. The water that flows from the sod will be reasonably clear. It will take longer for the flow to start and it will continue longer. Also, not as much water will reach the jar. The amount of water in the two samples before the experiment will affect the results somewhat. Unless the soils are waterlogged, however, the activity will be successful. The samples need not be completely dry.

5. What conclusions can be drawn from this experiment? How is soil erosion prevented by ground cover?

Conclusions and Interpretations: This activity illustrates one of the most fundamental principles of soil and water conservation -- the protection grass or cereal crops give soil against the pounding of raindrops and the movement of running water. The grass breaks the force of the raindrops so that the soil is not pounded and broken apart by this impact. The grass roots open up channels to let water get into the soil. Organic matter furnished by decayed grass crops also lets water enter more readily. And as the water runs off, the stems of grass slow it down so that is does not have enough speed to disturb the soil.

Experiment II: Effect of Straw Mulch on Soil Erosion

Part 1

Preparation:

1. Use the same boxes you made for Experiment I. This time fill both boxes with the same kind of soil. Set them on the table as before, placing the sticks under one end to make a slope. Cover one box of soil with a thin layer of straw, grass, or wood shavings; leave the other one bare. Sprinkle water on both boxes, using the same amount of water and pouring at the same rate from an equal height.

Observations:

2. Record your observations. Note how much and how fast water runs off into each fruit.

3. What conclusions can be drawn from this experiment? How can a mulch of straw, grass or shavings prevent soil erosion?

Interpretation:

Water impact puddles the bare soil, clogging the surface pores. The result is that the soil cannot take in water. In a field, most of the water would run off rather than enter the soil. By protecting the pores at the surface of the soil with a mulch, water enters and moves down through the soil.

4. How can a mulch of straw, grass or shavings prevent soil erosion?

A mulch, such as straw, grass, or shavings, prevents the puddling or "running together" of the surface soil under the impact of raindrops. Dead plant materials protect the soil from being detached by raindrops. As long as the soil is granulated, water will soak in rapidly. However, water soon softens the binding material that holds the granules together, and then the granules and clods disintegrate. The impact of raindrops separates the fine particles, splashing them into the air. Then these particles accumulate on the soil surface and fill the spaces between larger particles and granules. This result is a "seal" over the surface that permits water to enter the soil very slowly, if at all. Water must then run off. If the land is sloping, hard beating rains cause erosion.

Worksheet

Find an example of erosion
and TAKE ACTION

1. State the problem.

   _____

   _____

   _____

   _____

2. Suggest several possible actions that may help to correct the problem.

   a.

   b.

   c.

   d.

   e.

   f.

   g.

   h.

3. Choose the best actions and prepare a 3 step Plan of Action:

   1.

   2.

   3.

4. Results - Was a solution found to the problem? How did the plan work?

SOIL CONSERVATION

Wind and water are the chief erosion hazards in Alberta. Erosion by wind can be serious in the southwest, particularly in drought years. It is a major concern on the Brown and Dark Brown soils of Alberta in the spring and fall months, and in the chinook belt in the winter. All soils are most vulnerable to drifting in May and June when little plant cover is present to give protection from the wind. Sandy soils in all areas are the most vulnerable.

Prevention centres around the practice of trash-cover farming. It is a system of managing cereal stubble and other plant residues to protect the soil from erosion. Excellent protection is obtained in 1,700 - 2,300 kg/ha (1,500 - 2,000 lb/ac) of trash are maintained on the surface of a fallow field and is much of this cover is carried over on to the seeded field. Spring wheat produces about 45 kg (100 lb) of straw and stubble with each bushel of grain in the Dark Brown soil zone.

In northern Alberta, trash cover for winter protection is also a necessity. Here deep late fall cultivation 13 - 15 cm (5 - 6 in) with some incorporation of the stubble and crop residue is advisable. On sloping, fine textured soil, it is good practice to cultivate across the slope to reduce spring run-off.

One of the tillage machines recommended for use in making trash cover is the wide-blade cultivator, invented by Dr. Noble of Nobleford, Alberta in 1930. It reduces trash cover by only 5 percent each time it is used.

Trash cover farming is usually combined with strip farming which reduces erosion by cutting down the wind's velocity at the soil surface and localizing drifting, thus reducing the cumulative movement of soil. Strip farming is the growing of grain or forage in narrow strips alternating with trash cover fallow. If is a recommended practice in all the drier regions. Strips are at right angles to the prevailing wind.

Shelberbelts are another method of wind erosion control. They decrease wind velocity and result in increased yields on the leeward side.

In moist regions cover crops are used to prevent wind erosion. In sandy areas, seeding to permanent pasture is recommended and on irrigated land, fall plowing is recommended. Soil drifting can be checked by any tillage operation that produces a rough surface with lots of soil clods.

WATER EROSION: This depends on rainfall intensity and amount, soil properties, protective trash and topography. Soil cultural practices that reduce the exposure of bare soil to rainfall and maintain soil in good tilth, thus increasing the rate of infiltration, will prevent water erosion. Spring run-off while the ground is frozen can be a problem on land with long shallow slopes. If gullies form, they can be sown to grass or put under tree cover.

*This Land of Alberta - Alberta Agriculture.

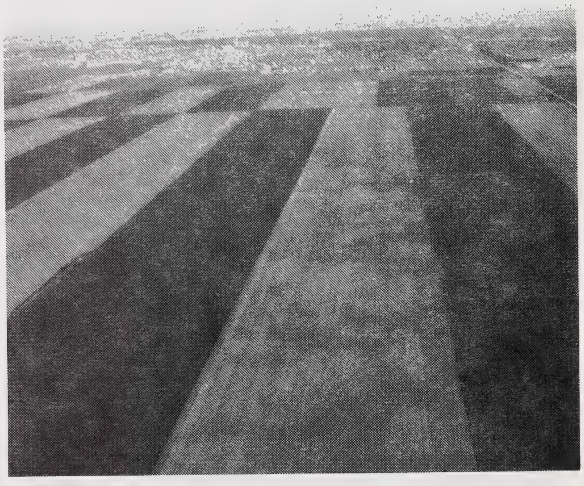
1. Top soil from ¼ section land piled up along fence line. A5668 1952.

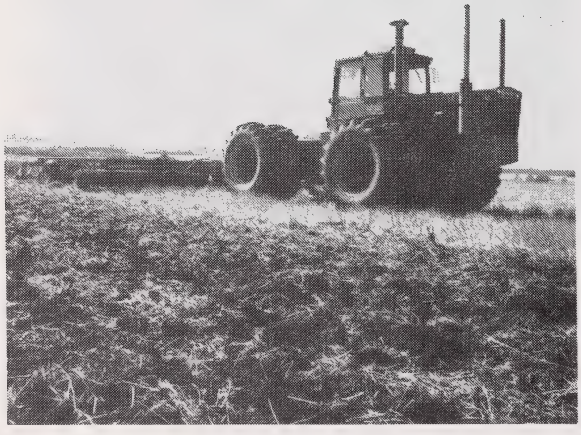
2. Soil drifting on irrigated land NE of Coaldale. A5669 1959.
Provincial Archives of Alberta.

THE SOLUTION

Shelter Belts

Strip Farming





Trash Cover Cultivation

Activity 21

WEATHER OR NOT GAME

Activity:

Students play the Weather or Not Game.
Long multiplication Math Skills and Language Arts skill required.

Subject Area:

Science - Optional directions for Grade 4.

Curriculum Direction:

Earth, Space and Time: Weather

Measuring and predicting weather conditions which influence our lives.

Major Concept:

Weather has an economic impact on peoples lives.

Lesson Concept:

The Agricultural industry has been developed to take advantage of predictable weather patterns which occur in specific areas. These weather patterns are variable enough to be a major factor in yields and quality of agricultural products.

Purpose:

To illustrate the influences, both positive and negative, of seasonal and daily weather patterns on the growth and development of crops grown in Alberta.

To show the correlation between plants' response to weather conditions and the economic returns to Alberta's farmers.

To give students an opportunity to practice their math skills.

Materials Required:

Assembled game board and accessories supplied in the manual.
Token Farmers (4 - 6).
1 Dice.
1 copy of tally sheets per player.
Pencil.
Calculator to assist with math if desired.

Time Required:

2 class periods

BACKGROUND — to the teacher

This game focuses on the weather factors which influence the agricultural industry in Alberta.

The lesson consists of two options for game rules based on math skills difficulty level.

Option A (the main rules) focuses on math skills that are complex and is recommended for grade five or six students with "good" math skills.

Option B (the modified tally sheet and scoring system) will still demonstrate the effects of weather but can be easily played by grade four students. To play this version, the players disregard the price sequences at the end of the game board.

PROCEDURE

Part 1

Introduction:

1. The lesson may begin by discussing today's weather. Is it good or bad? What season is it? Is this the kind of weather we expect in this season? How do you feel about weather? How does weather affect your life?

2. Discuss some people whose life styles are influenced by the weather. (Fire fighters, parks officials, resort owners, airlines, road construction workers, farmers.)

3. The exercise today is a game of chance. This game reflects a real life situation. It will help us to appreciate the economic effects weather has on one of Alberta's largest industries - agriculture.

Part 2

The Rules:

4. Divide the class into groups of 4 - 6 students.

5. Discuss with the class the rules of the game. Make sure that each group has a copy of the rules and a game set.

Part 3

Assemble the game:

6. Have each group assemble their game board.

7. Each group will require 2 dice and each member of the group should have a token "man" which he will use to play the game. These are not supplied with the kit. Each player must be able to identify his own token.

Part 4

To keep score we will be using crop prices for agricultural products.

8. Establish the grain prices on the tally sheet using either of the following methods:

   a) Roll the die and choose good, average or poor prices according to the following guide.

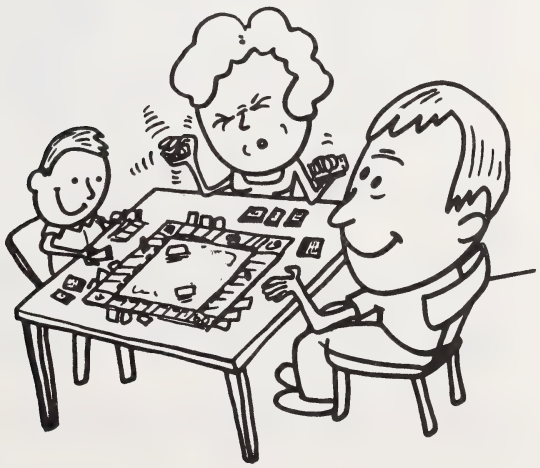
Die Roll	1 or 2 poor	3 or 4 average	4 or 6 high
Wheat	2.75 unit	3.00 unit	4.50 unit
Oats	.75 unit	1.00 unit	1.50 unit
Hay	1.00 unit	2.00 unit	3.00 unit
Canola	5.00 unit	6.50 unit	8.00 unit
Barley	.85 unit	1.75 unit	2.50 unit

   b) Call Alberta Wheat Pool, a local elevator or feed distributor for current grain and hay prices and fill these in the tally sheet.

9. Enter established crop prices on the tally sheets.

Part 5

Playing the Game:



GAME RULES - OPTION A

1. Read all the rules carefully before proceeding with the game.

2. All calculations should be done after the player gets to the finish. Do not add in advance. You will have to do it again. Use a calculator to assist you if your teacher permits.

3. Enter established crop prices on tally sheet.

4. To start - roll the die. The player with the highest count goes first.

5. Advancing tokens around the board. On your turn, roll the die and move your man the number of squares indicated. If you land on a season square, you must roll to find the weather conditions. The particular season is indicated on each square.

6. Weather conditions and crop yields. After each move the player must roll again to find out the weather conditions. If a player's man has arrived on a "spring" square, he must roll the die and then look on the Spring weather conditions guide and follow the directions indicated by the number of his roll. These will be recorded on his tally sheet under the grain field that he is in at the time.

   Example: Player 1 has a man on Summer barley. He rolls the die and turns up a 3. The summer weather conditions guide tells him that the weather is "Warm August, crops maturing well". + 50 Units of crop.

   The player will then enter 50 on the plus side of his Tally sheet for barley.

7. Crop Insurance. If a player lands on a "crop insurance" square, he may purchase crop insurance by placing -10 on the losses side of his tally sheet. If he chooses to take out crop insurance, the next crop loss condition that he rolls is not recorded on the Tally sheet. Do not roll for weather conditions when on a "crop insurance" square.

8. Do not pass the solid dark square until you have established your crop yield by doing the following:

   Each time a player gets to a solid dark square (the last square of each field) he must roll the die to find his crop yield. Multiply the number shown on the die by 100 to get his crop yield for that field. After entering this number on the Tally Sheet as a gain, they may then proceed to the new field.

   Do not calculate crop yields or crop values until the end of the game!

9. Crop Values. When a player has moved out of the barley field, he will still be at the mercy of the weather. Some squares will indicate favourable and unfavourable weather conditions for crop values. He will then find if he gets a bonus or a penalty on his crop values. These must be established before final calculations of net worth are made. These losses or bonuses apply to all crops.

   Example: a bonus for "seed" quality may make all of his crops worth $.50 more per unit.

10. Players finishing first receive a bonus of 100 units of each crop. Players finishing second receive a bonus of 50 units of each crop.

11. The winner is the player who has accumulated the most valuable crops as indicated by the Total Crop Value on the final tally sheet. You may wish to work through these calculations as a group after all players have completed one trip around the game board.

Weather Conditions

OPTION A

Spring Weather Conditions Guide

1	Excellent Warm Weather	+ 50 Units
2	Dry, windy weather; causes Soil erosion	- 30 Units
3	Good conditions; finished seeding early	+100 Units
4	Cool spring; late germination	- 50 Units
5.	Heavy rain; tractor stuck in mud	- miss a turn
6.	Hot dry windy spring; sparse germination	- 25 Units

Summer Weather Conditions Guide

1.	Three day gentle rain, mid-June	+ 50 Units
2.	Warm Sunny weather	+ 50 Units
3.	Warm August; crops maturing well	+ 30 Units
4.	Heavy Hail; extensive damage	-100 Units
5.	Hot weather, causes drought	- 75 Units
6.	Cold, wet; August crops mature slowly	- 25 Units

Fall Weather Conditions Guide

1.	10 day dry spell in September; harvest ½ complete	+100 Units
2.	Rainy September - miss 2 turns	
3.	Warm windy weather	+ 75 Units
4.	Snow in early October	-100 Units
5.	Early evening dew; slows harvest	- 25 Units
6.	Late frost; good grain yield	+ 50 Units

TALLY SHEET — OPTION A

WHEAT

	+ Gains	– Losses
Total		

Subtract losses

Wheat Yield: _____

Basic Wheat Price: per unit

Add or subtract bonus or penalty _____

Wheat price _____

× Wheat Yield _____

CROP VALUE _____

CANOLA

	+ Gains	– Losses
Total		

Subtract losses

Canola Yield: _____

Basic Canola Price: per unit

Add or subtract bonus or penalty _____

Canola price _____

× Canola Yield _____

CROP VALUE _____

OATS

	+ Gains	– Losses
Total		

Subtract losses

Oat Yield: _____

Basic Oat Price: per unit

Add or subtract bonus or penalty _____

Real Oat price _____

× Oat Yield _____

CROP VALUE _____

BARLEY

	+ Gains	– Losses
Total		

Subtract losses

Barley Yield: _____

Basic Barley Price: per unit

Add or subtract bonus or penalty _____

Barley price _____

× Barley Yield _____

CROP VALUE _____

HAY

	+ Gains	– Losses
Total		

Subtract losses

Hay Yield: _____

Basic Hay Price: per unit

Add or subtract bonus or penalty _____

Hay price _____

× Hay Yield _____

CROP VALUE _____

Wheat Crop Value: _____

Oat Crop Value: _____

Hay Crop Value: _____

Canola Crop Value: _____

Barley Crop Value: _____

TOTAL CROP VALUE _____

GAME RULES - OPTION B

1. Read all the rules carefully before proceeding with the game.

2. Players must not calculate crop values before the entire game is finished. When playing option B, disregard the directions on the last 6 squares of the board.

3. Choose one player to act as a weather person. This person may play the game as well. It is important that the weather person read all of the weather conditions out loud to the group so that players learn how the weather is affecting their crops.

4. To start - all the players roll the die. The player with the highest count goes first.

5. Advancing tokens around the board. On your turn, roll the die and move your man the number of squares indicated. If a player lands on a season square, he/she must roll to find the weather conditions. The particular season is indicated on each square.

6. Weather conditions and crop yields. After each move the player must roll again to find out the weather conditions. Ask the weather person to read the weather conditions and the crop gains or losses out loud. The player will then enter the results on his/her tally sheet under the grain field that they are playing at the time.

   Example: Player 1 has a man on Summer barley. He rolls the die and turns up a 3. The summer weather conditions guide tells him that the weather is "Warm August, crops maturing well". + 1 Truckload.

   The player will then enter 1 on the plus side of his/her Tally sheet for barley.

7. Crop Insurance. If a player lands on a "crop insurance" square, he/she may purchase crop insurance by debiting his/her crop 1. If he/she chooses to take out crop insurance, the next crop loss condition that he/she rolls is not recorded on the Tally sheet. Do not roll for weather conditions.

8. Players must not pass the solid dark square until they have established their crop yield.

   Each time a player gets to a solid dark square (the last square of each field) he/she must roll the die to find his/her crop yield. Multiply the number shown on the die by 10 to get his/her crop yield for that field, proceed to the new field.

9. Players finishing first receive a bonus of 2 Truckloads of <u>each</u> crop.

   Players finishing second receive a bonus of 1 Truckload of <u>each</u> crop.

   Enter these bonuses on the tally sheet under gains for each crop played before doing final calculations.

10. <u>The winner</u> is the player who has accumulated the most truckloads of crops.

Weather Conditions

OPTION B

Spring Weather Conditions Guide

1.	Excellent warm weather	+ 2 Truckloads
2.	Dry, windy weather; causes soil erosion	- 1 Truckload
3.	Good conditions; finished seeding early	+ 4 Truckloads
4.	Cool spring; late germination	- 2 Truckloads
5.	Heavy rain; tractor stuck in mud	miss one turn
6.	Hot, dry, windy spring; sparse germination	- 1 Truckload

Summer Weather Conditions Guide

1.	Three day gentle rain, mid-June	+ 2 Truckloads
2.	Warm sunny weather	+ 2 Truckloads
3.	Warm August; crops maturing well	+ 1 Truckload
4.	Heavy hail; extensive damage	- 4 Truckloads
5.	Hot weather; causes drought	- 3 Truckloads
6.	Cold, wet; August crops mature slowly	- 1 Truckload

Fall Weather Conditions Guide

1.	10 day dry spell in September; harvest ½ complete	+ 4 Truckloads
2.	Rainy September	miss two turns
3.	Warm, windy weather	+ 3 Truckloads
4.	Snow in early October	- 4 Truckloads
5.	Early evening dew; slows harvest	- 1 Truckload
6.	Late frost; good grain yield	+ 2 Truckloads

TALLY SHEET — OPTION B

WHEAT	+ Gains	- Losses
TOTAL		
Subtract losses		
WHEAT YIELD		

OATS	+ Gains	- Losses
TOTAL		
Subtract losses		
OATS YIELD		

HAY	+ Gains	- Losses
TOTAL		
Subtract losses		
HAY YIELD		

CANOLA	+ Gains	- Losses
TOTAL		
Subtract losses		
CANOLA YIELD		

BARLEY	+ Gains	- Losses
TOTAL		
Subtract losses		
BARLEY YIELD		

Wheat Crop Yield _____

Oat Crop Yield _____

Hay Crop Yield _____

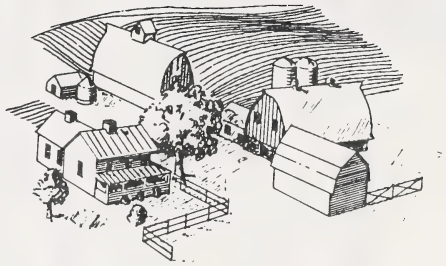
Canola Crop Yield _____

Barley Crop Yield _____

Total Crop Yield _____

Price: $100.00/Truckload

TOTAL CROP VALUE _____



THE CLIMATE

Farming in a northerly latitude in a region with a continental type of climate such as Alberta's is strongly affected by numerous factors such as the frost-free period, precipitation, amounts and dryness of winds, heat units, hours of daylight, and so on.

For large parts of the occupied areas of Alberta, weather records for about 100 years are available and farming has been practiced for 50 to 75 years in the major agricultural areas of the province.

The combination of meterorlogical data, accumulated farming experience and increasingly detailed knowledge of Alberta soils obtained by soil surveys has enabled the preparation of an agro-climatic map.

The interior location of the province on the continental mass results in greater heating in summer and cooling in winter and in less precipitation than is present in marine areas. Mountain barriers to the west inhibit the flow of mild moist air from the Pacific, ease the flow of cold air from the north in winter, and warn air from the southeast in summer. The warm Pacific and cold Hudson Bay currents contribute to downward southeast to northeast temperature gradients.

Alberta's latitude places the province under the influence of prevailing westerlies aloft at about 6 km (20,000 feet). Migrating low pressure areas, caught in the westerlies aloft, usually cross the province systems, often called storm centres, lose much of their moisture on the western slopes of the mountains and consequently bring only meagre precipitation to Alberta. Occasionally, however, once it has crossed the mountains such a storm center may intensify significantly and produce widespread rain. In most years three or four of these systems developing in spring or early summer provide the main moisture base for the growing season.

When the winds aloft shift to north or northwest, cooler air masses enter the province from the Northwest Territories. If this happens in

winter the result if usually a cold outbreak. Blizzards occasionally accompany such outbreaks. Southerly winds aloft on the other hand are usually accompanied by warm weather, and in summer hot humid air from the central United States can spread into southern Alberta.

Alberta is too far inland to enjoy the moderating influence of the Atlantic Ocean or the Gulf of Mexico. The Pacific Ocean, however, being only 48 km (300 miles) from the western boundary exerts profound influence on the climate. However, the environmental variability is extreme in Alberta, the land being from 240 to 1,200 m (800 to 4,000 ft) above sea level in the plains region and over 2,400 (8,000 ft) in the mountains. Most of the province receives from 300 to 500 mm (12 to 14 in) of annual rainfall as well as varying amount of snow usually corresponding to some 50 to 150 mm of water. The number of frost-free days ranges from fewer than 60 to over 125 per year.

In the winter cold polar continental air masses which move down over Alberta are frequently modified in the southwest by mild air from the Pacific to which the heat of condensation from heavy snowfall in the mountains and adiabatic heat from the descent down the eastern slope have been added. This produces the chinook wind, which is dry. Rapid melting and evaporation take place during chinooks. A chinook wind can cause a rise of 25 to 35°C in a few hours' time. The significance of the wind for agriculture lies in its ability to clear snow from grazing land, thus allowing cattle to feed in the fields in winter. On the other hand, it has a severe drying effect in spring and summer so contributes to wind erosion. The alternate thawing and freezing of winter chinooks have a detrimental effect on trees, shrubs and forest cover by causing winter kill. Because of the strong winds, strip farming is practised in parts of southern Alberta. This cultural method originated as a result of the joint efforts of Alberta soil scientists and framers in the 1930's who sought a solution to wind erosion problems in farm fields. Damaging winds are most common with consequent soil erosion, lodging or crops, increased heat requirements for people and livestock, wind chill and visibility changes.

Precipitation

In general, agricultural areas get two-thirds of their annual precipitation in the months of May to September. The annual snowfall contributes roughly one-third of the total precipitation. As a rule of thumb, 1 cm of snow equals to 1 mm rain (or 10 in. of snow equals 1 in. of rain).

Snow does not always contribute to the moisture base as it is often evaporated by the chinooks in the south. In the Peace River region, heavy spring runoff wastes much of the moisture from snow. Areas with a likely moisture deficit require utilization of dryland farming techniques. "Moisture deficit" is based on the difference between potential evapotranspiration (if moisture were not limited) and the estimated available moisture (precipitation and soil-stored moisture).

Hail

Parts of Alberta have some of the highest hail frequenies in the world. Hail occurs within 145 km (90 miles) of Penhold on an average of 61 days in a year. Hail activity is greatest between June 20 and August 10. Normally 20% of a year's damage occurs on a single day and 50% on the season's four worst hail days.

The Alberta Hail Project operating out of Penhold is capable of seeding rainclouds as part of a weather modification program intended to reduce hail.

Temperature

Summer temperatures do not limit crop production in northern areas as much as might be expected since long daylight hours in the north compensate to the lower temperatures e.g. Fort Vermilion has 538 daylight hours in July and a mean temperature of 16°C (61°F), while Lethbridge has 488 daylight hours and a mean temperature of 19°C (66°F). The number of degree days and the frost-free period are especially significant for crop production.

A "growing degree day" occurs when the mean temperature for that day exceeds 42°F by one degree. The total number of growing degree days during a growing season accumulates and indicates the amount of heat available for crop growth. Wheat growing is not considered practical with fewer than 2,000 "growing degrees days" in a year.

The number of days between the last freezing temperature of the spring and the first frost in the fall is the frost-free period. A light frost usually does little harm but a killing frost, defined as -2°C (28°F) usually causes damage. The filling frost-free period is generally 3 to 4 weeks linger than the frost-free period.

(This Land of Alberta - Alberta Agriculture)

WEATHER OR NOT

Oats

Hay

Wheat

Canola

Barley

SUMMER | SUMMER | FALL | FALL | FALL | | SPRING | | SPRING | SPRING | SPRING | SUMMER | SUMMER | SUMMER | SUMMER

SUMMER
SUMMER
SPRING
SPRING
SPRING
SPRING

SUMMER
SUMMER
FALL
FALL
FALL
FALL

FALL | FALL | FALL | FALL

SUMMER
Crop Insurance
SUMMER
SUMMER
SUMMER

SPRING | SPRING | SPRING | Crop Insurance | SUMMER

SPRING

START
Roll 1 or 5 to Start

SPRING | SPRING | Crop Insurance | SPRING | SPRING

SUMMER
SUMMER
SUMMER
SUMMER

FALL | FALL | FALL | Crop Insurance

SPRING
SPRING
SPRING
SPRING

FINISH

Excellent Crop Bonus $.50 per unit

Frost Damage Reduce price $.25 per unit

Crop Too Wet Dock $.10 per unit for spoilage

FALL | FALL | FALL | FALL | SUMMER | SUMMER | SUMMER | SUMMER | SUMMER

				Insurance			
				SUMMER			
				SUMMER			
				SUMMER			
SPRING	SPRING	SPRING	Crop Insurance	SUMMER			
SPRING	START Roll 1 or 5 to Start						

	FINISH						
Excellent Crop Bonus $.50 per unit							
Frost Damage Reduce price $.25 per unit		Crop Too Wet Dock $.10 per unit for spoilage			FALL	FALL	

SUMMER | SUMMER | FALL | FALL | FALL | | SPRING

SUMMER

SUMMER

SPRING

SPRING

SPRING

SPRING

Oats

FALL | FALL | FALL | FALL

Wheat

SUMMER

Crop

WEATHER OR NOT

Hay

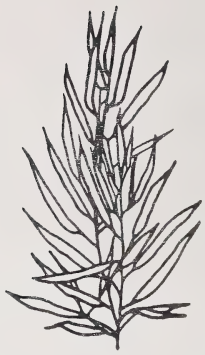
Crop Insurance


SUMMER

SUMMER

SUMMER

SUMMER



Canola

FALL | FALL | FALL | Crop Insurance

SPRING

SPRING

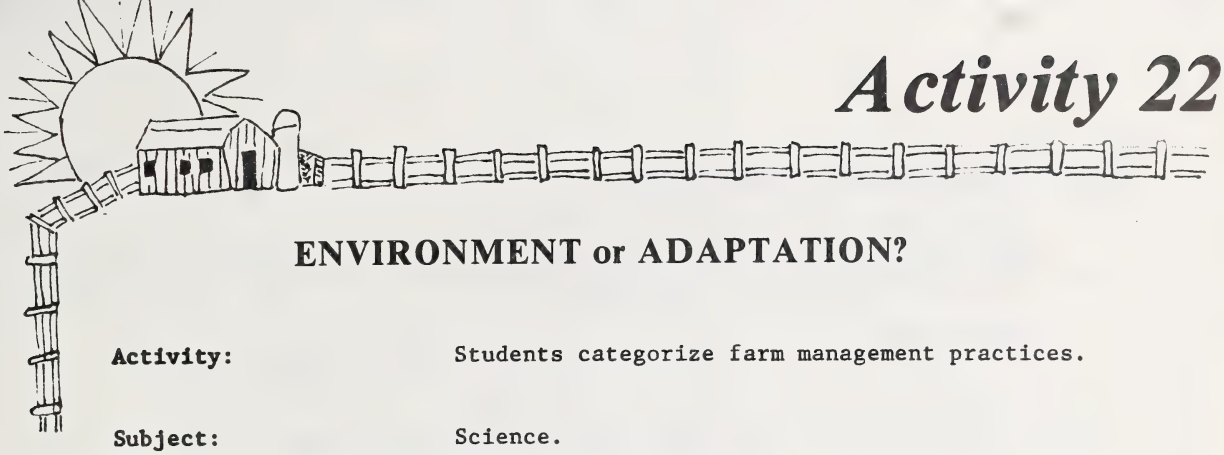
SPRING

SPRING

Barley

FALL | FALL | SUMMER | SUMMER | SUMMER | SUMMER | SUMMER

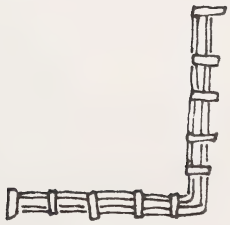
Participate in the Weather or Not game.



Activity 22

ENVIRONMENT or ADAPTATION?

Activity:	Students categorize farm management practices.
Subject:	Science.
Curriculum Direction:	Living things and Environment. Environment and adaptation.
Major Concepts:	Environments can be changed to meet the needs of animals. Animals can adapt to a variety of environments.
Lesson Concept:	Farm management uses both modification of environment and development of adaptation trying to achieve maximum production.
Purpose:	To show the practical application of knowledge of the environment and adaptations in a familiar industry. To identify actions which are specifically related to the environment or adaptation development.
Materials Required:	Supplied in this lesson. Optional - plants or seeds for experimentation.
Time Required	2 - 5 class periods.



BACKGROUND — to the teacher

Farmers make effective use of research which results in modifications of plants and animals. Different breeds of plants and animals are developed to thrive in special environments.

PROCEDURE

Two ways for organisms to thrive in their environment are:

1. Modify or change the environment to meet the needs of the organism.

2. The organism must develop special characteristics in order to adapt to the environment.

Effective farm management employs both of these strategies to improve the productivity of both plants and animals.

Part 1

Definitions:

3. Present the introduction to this lesson.
   Discuss "What is an environment?"
   "What is an adaptation?"
   "How are environments and adaptations related?"

Part 2

Exploring the concepts:

4. Look at the classroom environment.

   Ask the students to suggest ways that the classroom environment has been modified to meet their needs.

5. Have students suggest some ways that farmers might modify the environment of their livestock or crops to encourage greater production.

Part 3

Adaptations:

6. Ask students to suggest some common adaptations of animals.

   Adaptations are characteristics which are developed to enable an organism to survive in its environment. Examples are webbed feet, seeds in the form of burrs.

Through selective breeding of plants and animals special characteristics can be developed. These may make the organism more successful in producing food for humans. See how many examples of this form of management the class can suggest.

7. Introduce the Dairy Cow - Example.

8. Have students suggest some other adaptations that farmers might encourage in their plants and animals.

9. Ask the students to do the work sheet, "Effective Farm Management"

Part 4

Activity:

10. Have students create specially adapted Alberta plants or animals. They may get together in groups to assemble a model of a well managed farm operation.

    Students should be prepared to defend their inventions.

Conclusion:

11. Review the worksheets.

12. Have the students decide which management techniques they could recognize from the road.

13. Which are the responsibility of the farmer?

14. Which depend on the assistance from other people in Agribusiness?

15. Display the models and have students explain their creations with the class.

FOR DISCUSSION

1. Who are some of the people who might help farmers with their management? Environment? Adaptation?

2. How does good farm management affect the consumer (people in this class)?

RELATED ACTIVITIES

1. Using several plants of different varieties, study the effects of environmental change. (i.e. drought resistance, or light sensitivity.)

   Good plants to include may be cactus, or low light tropicals This will help to show the special adaptations of some species.

Worksheet

EFFECTIVE FARM MANAGEMENT

Decide which of the following Farm Management Practices are examples of:

1. Changing the Environment.
2. Developing special Adaptations.

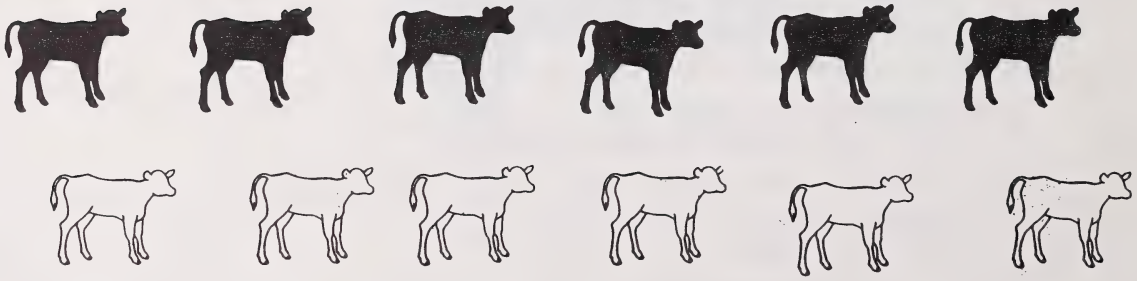
If the example is Environmental, make a "X" in the Environmental column.
If the example is Adaptation, make a "X" in the Adaptation column.

Farm Management Practices	Environment Change	Selecting Adaptations
1. Dig water holes in various places in the pasture so cattle will use the whole pasture.		
2. Develop early maturing grain to avoid frost in a short growing season.		
3. Develop special breeds of sheep which grow wool that is good for rug making.		
4. Plant shelter belts to control wind.		
5. Raise chickens that have small bodies and lay good numbers of large eggs.		
6. Make special feeds to help animals grow quickly or produce more.		
7. Keep dairy cattle in small places to increase feed intake and limit exercise so that they increase their milk production.		
8. Develop special wheat with a solid stem which will resist attacks by sawflies.		
9. Irrigate certain areas to assist growth of certain plants.		
10. Laying hens are given extra light in winter to encourage them to continue production.		

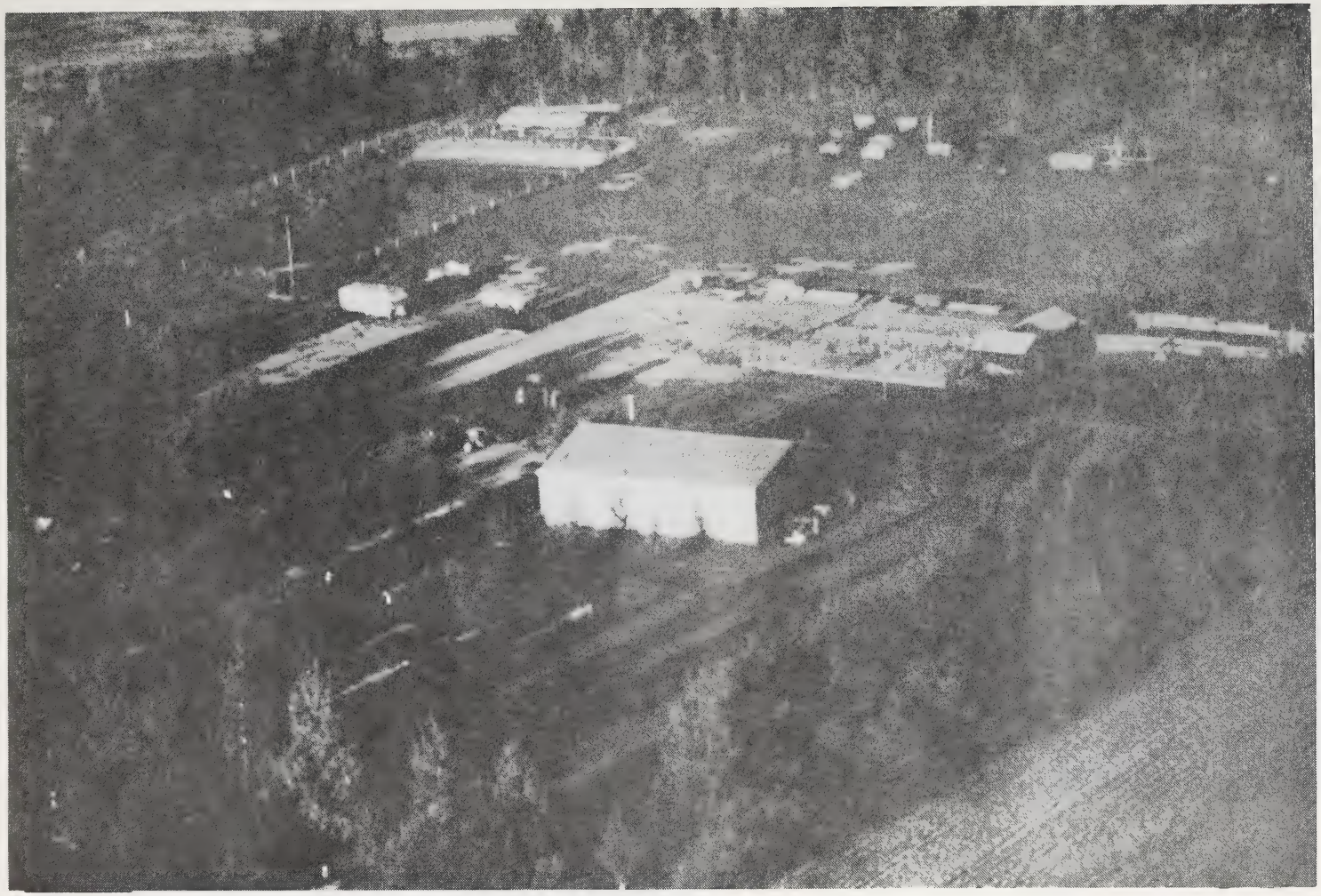
DAIRY COW ADAPTATIONS

People all over the world use dairy products. Milk, cheese and butter are part of the diet in most countries. Although most of the milk is from dairy cows; milk from goats, sheep, water buffalo and horses is also used.

Dairy cattle as we know them, did not always exist. These breeds developed because of careful selection by cattle producers. This was done by breeding the sons and daughters of good producing cows. The good animals were kept and poor producers were culled. Because people used the breeding stock in their area, many related animals were bred to each other. After several centuries this began to produce cattle that looked similar to each other in size, conformation, colour and production. As the volume of milk increased, milk and milk products were made available to more people. City dwellers were able to buy the volume of milk they needed daily.

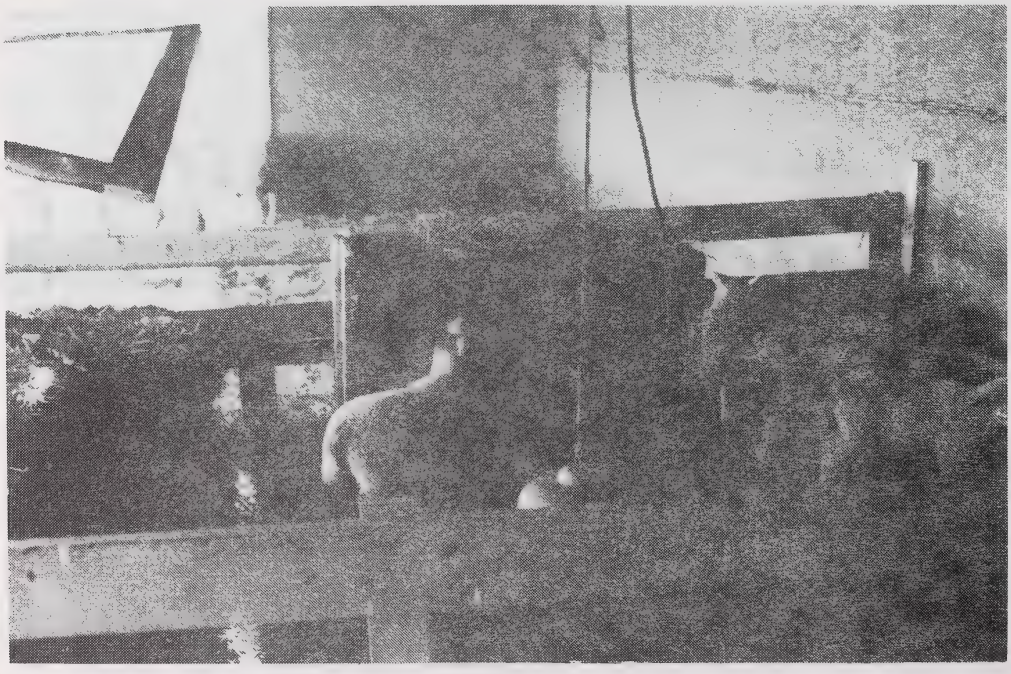


One dairy cow produces enough milk to feed 12 to 15 calves in one year.



How many environmental changes can you find in this picture?

Animals raised in controlled environments grow faster.



Some plants require special conditions to thrive.

By controlling the environment, plants can be grown out of season.

Activity 23

NATURAL FOOD PRODUCTION

Activity: Students debate the issue of Organic Farming.

Subject Area: Language Arts - Grades 4, 5 and 6.

Curriculum Direction: Reading comprehension.
Speaking to the issue.

Major Concepts: Taking a stand.

Technical and chemical development.

Lesson Concepts: A responsible opinion depends on an informed decision. How are we influenced by what we read and hear? How important is it to be well informed?

Purpose: To improve reading comprehension.

To synthesize responses to questions from literature.

To practice speaking skills and improve communication skills.

Materials Required: Supplied in this lesson.

Time Required: 2 class periods.

BACKGROUND — to the teacher

The information in this lesson is intended to represent opposing views of food production issues and does not reflect the attitude of Alberta Agriculture. This lesson is simply an exercise in dealing with both factual and emotional approaches to the dissemination of information. It is not designed to have students establish the best method of raising food for human consumption. Rather, they are encouraged to take a stand and voice an opinion without fear of being right or wrong.

This lesson contains information which supports both conventional and organic farming methods. There are many strong opinions about the use or non-use of chemicals in food production and packaging. There are two issues presented:

1. Farming practices and chemicals.
2. Processing practices and non-food additives.

PROCEDURE

Part 1

Gathering Information:

1. Divide the class into two groups. Give group A the essay "Organic Farming". Give group B the essay "Conventional Farming".

2. Allow the class sufficient time to read over their material. Groups may be allowed to discuss the information before the interview. The students will be reading to find arguments for or against Organic or Conventional farming practices.

Part 2

Giving Opinions:

3. The teacher or a student may conduct the "Man on the Street Interview". Questions may be those provided in this lesson or the interviewer may make up his/her own. Make sure that all students are asked the same questions.

OR

The class may stage a panel discussion or a debate with the teacher acting as the coordinator.

Part 3

Evaluation:

Students will be graded by their peers on the following:

- Understanding the material.
- Answering the questions.
- Giving clear and concise answers.
- Responding enthusiastically.
- Preparing convincing agreements.

Students should be made aware of the things the teacher is looking for in the responses by a brief discussion of the evaluation form which is provided.

4. The interviews should be taped so that the whole class can hear the responses once the exercise is complete.

Conclusion:

5. Play back the discussion or interviews to the class.

FOR DISCUSSION

1. After listening to the tape, would you change some of your opinions? Why?

2. Is it good to have opinions? How can we be well informed?

RELATED ACTIVITIES

1. Exchange essays and interview the class again.

2. Conduct a "Man on the Street" interview about a controversial topic in your school. Example, dress code, smoking, homework.

3. Compare prices and quality of food goods in a health food store or a market. Read the labels for additive content.

OPTIONAL RESOURCE MATERIAL

Sustainable Agriculture Association
Box 1063
NANTON, Alberta
T0L 1K0

Agri-fax/Alberta - Agdex 090-1
January 1986
"Fertilizers and the Environment".
Available from:
Alberta Agriculture
Print Media Branch, Main Floor
7000 - 113 Street
EDMONTON, Alberta T6H 5T6

Suggested Interview Questions:

1. Do you feel that chemicals should be used in the production of human food?

   Why?

2. How could the production of human food be improved for quality and quantity?

3. What would happen if the use of chemicals were prohibited in the production of human food?

STUDENT EVALUATION

Ratings out of 10. Total possible score = 50

NAME	Understands Material	Answers the Question	Speaks Clearly	Enthusiasm	Argument Convincing	TOTAL SCORE

OPINION:

Organic Farming Practices Should Be Used On Alberta Farms

Organic Farming could be called natural farming because it uses natural growing cycles, fertilizers, and controls for weeds and pests. In a simple way, you might say that Organic Farming does not use or limits the use of chemicals to help make plants and animals grow.

Quality of Food:	Food grown using organic cultivation is healthier than other food because if has not been in contact with chemicals. Some chemicals are actually poisons. Organic food is pure - just the way nature planned it to be.
Quantity of Food:	The amount of food that can be grown using these methods is not a big problem. We admit that a farmer gets smaller yields. However, we already have a food surplus in Alberta. It is more important to get good nutrition than large quantities of food that may not be good for us.
Safety for Consumers:	People who buy organically grown food can be sure that the food they eat is safe for them. Especially children can have bad reactions to food that has been treated with harmful chemicals. You can not see the chemicals and therefore you are not sure if they are in or on your food. It is hard to know what long term harmful effects some of the new chemicals may have on our bodies because there has not been enough time to test them.
Cost:	Once a farmer is in the system of organic farming, he or she will find that they do not have to spend money on expensive chemicals. By using natural fertilizers and by weeding the farmer recycles wastes the way they would in nature. This is sufficient to feed the plants and keep the soil healthy.
Environmental Effects:	Chemicals give off toxic gasses and pollute water supplies. On the farm they can be hazardous to animals and people. Places where the chemicals are made are especially dangerous for our environment. If Alberta farms did not use chemicals - and if our food manufacturers did not use chemicals, we would not need to make and store as many of these dangerous substances.

Conservation Issues:

Saving our natural resources both renewable and nonrenewable should be a concern for everybody. Organic farming uses less nonrenewable resources (like oil and gas) and is very good for our renewable resources as well. Most agricultural chemicals are made from nonrenewable resources. Before too long, these will be in short supply. Doesn't is make good sense to use these as slowly as possible. By using natural fertilizers and natural pest control methods, we can extend the supply of nonrenewable resources.

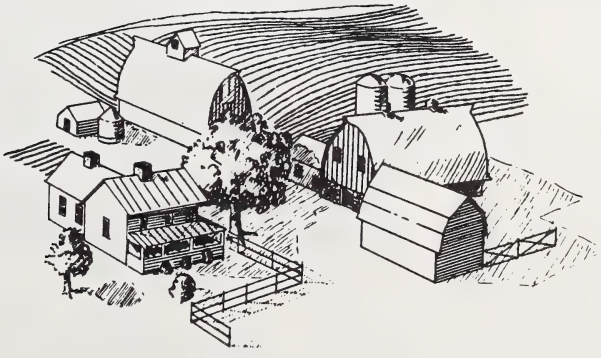
Organic farming puts natural substances back into the soil thus keeping it healthy and restoring its' own natural chemistry. It is very important to keep our agricultural soils from erosion and in healthy condition so that they can be used to grow food in the future.

Water that has been polluted by chemical manufacture or use is harmful to both humans and animals. By restricting use of chemicals, we can prevent dangerous substances from contaminating our water supplies.

Additives:

These are substances which are added to food to make it stay fresh longer or to change the colour or to raise its' nutrition level in some areas. These are artificial. Humans and plants and animals were not originally made to require these additions.

Don't you think it is better to eat truly fresh food and a good variety of food in order to get good nutrition than to eat a collection of chemicals which are artificial most not even food, which may even make you sick?



OPINION:

Conventional Farming Practices Should Be Used On Alberta Farms

Conventional Farming: Conventional farming uses special chemicals and farming techniques to improve land fertility and to control pests such as weeds, insects, and disease in our food products. These methods are the most modern and have been found to produce good results in Alberta.

Quality of Food: The food produced by conventional farming methods is very good. The plants and animals are large, and healthy. They do not have the scars of pests or contain disease. These are the good looking foods on your market shelves.

Quantity of Food: As our world population increases year by year, it is important to get the most food from our land that we can. Conventional farming practices produce 15 - 25% more food on the same amount and type of land as organic practices. This increased yield means that the world will have enough to eat. Through conventional practices, even poor quality land can produce good food, therefore further increasing the world food supply.

Safety for Consumers: Chemicals which are used in the production and processing of your food have been thoroughly tested to make sure that they are safe to use in food production. Because these are used to maintain freshness and to control disease and pests, the food you buy is not spoiled by these agents. If you do not want to share your fruits and vegetables with bugs and fungus, you will probably appreciate what conventional farming practices do for you. Even during processing, harmful bacteria can be controlled so that the food you eat is healthy and free of disease.

Cost: Because of the increased yields, farmers can afford to use conventional farming methods to help with their production. You, the consumer, get even greater benefits because your food is low priced and does not spoil on the way home from the store. When plants and animals are free of weeds, parasites, and disease, the cost of production is greatly reduced. Fewer plants and animals die. They grow larger, faster and the cost is much smaller.

Environmental Effects: The rules for the production and use of chemicals are very strict. Therefore the risk of pollution in the environment is small. Special storage and application equipment has been developed so that workers can safely use these substances without spilling or having them contaminate our air or water.

Conservation Issues: More oil and gas is being discovered every day. In the foreseeable future there is little risk of even running low of these resources if they are not wasted. Use of resources to produce human food can hardly be called wasting. As far as the maintenance of good soil quality, conventional farming practices can actually improve soil quality. The plants grown by conventional methods are larger and healthier. Since on a grain crop we only use the seeds, there is more straw (organic material), to return to the soil to feed it for next years crop. It is not so much chemicals as tillage practices which may cause soil erosion. Conventional farming, through the use of weed killers, allows farmers to limit the tillage of their land, thus preventing soil loss due to wind or water erosion.

Additives: Additives are used to improve food quality and make it last longer. Since few of us produce our own food, there is some time between harvesting the food and having it on the store shelves for the consumer. Every effort is made to make sure that our food is fresh and safe to eat. Some additives help food to last longer. Therefore it is cheaper and safer for you. Some things that are added to food make it more nutritious. This helps you to meet your daily requirements so that you will grow and stay healthy. Some additives make food look and taste better and you know how nice that is.

Reference Books:

Organic and Conventional Farming Compared
Council for Agricultural Science & Technology
Report 21 84
October 1980

Science of Food & Agriculture. Volume 2. Number 2
Science of Food & Agriculture
March 1974

Volume 2 Number 4
November 1984

Report and Recommendations on Organic Farming
United States Department of Agriculture

Organic Agriculture. Economic and Ecological Comparisons
with Conventional Methods.
Robert C. Oelhof

Back to Eden
Jethro Kloss

Linda Clark's Handbook of Natural Remedies for Common Ailments

Good Food Naturally, How to Grow it, Cook it, Keep it.
John B. Harrison

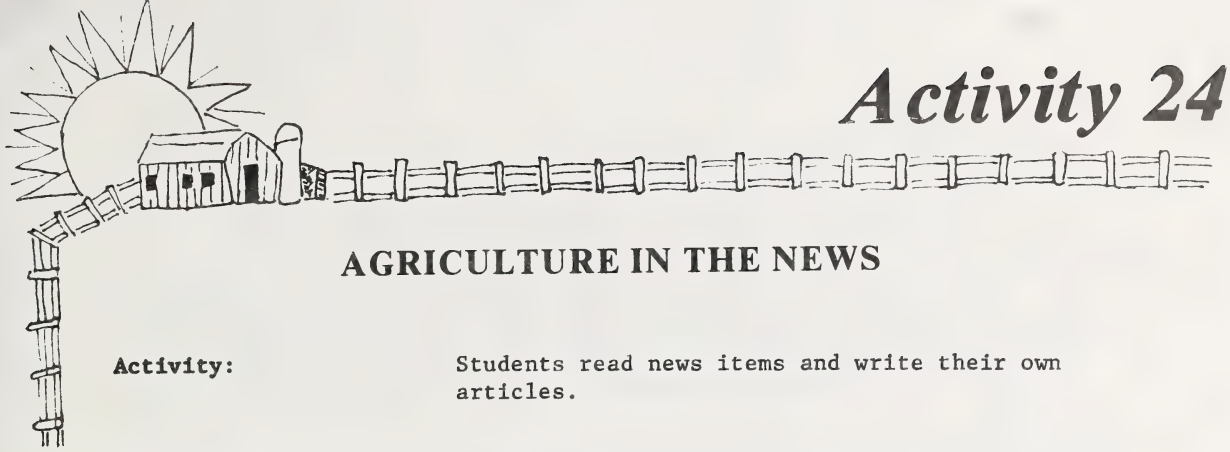
Fertilizers and the Environment - Alberta Agriculture, Agdex 090-1,
January 1986

Crop dusting

and

Chemical fertilizers

help farmers
produce high
yeilding disease
free crops.



Activity 24

AGRICULTURE IN THE NEWS

Activity: Students read news items and write their own articles.

Subject Area: Language Arts and Social Studies.

Curriculum Direction: Reading for information.

Major Concepts: The media is an information source.

Newspapers provide us with a connection to the outside World.

Lesson Concepts: Agriculture has a voice in the media.

The concerns of Agriculture are both local and international.

Purpose: To practice reading for information.

To develop research skills.

To practice organizational skills.

To learn some new facts about Alberta Agriculture.

Materials Required: 18" x 24" art paper .
Newspapers and current events.

Time Required: 2 class periods plus several short home work assignments.

BACKGROUND — to the teacher

This Activity would be best done in the Spring or Fall season.

For most us of, the major information source is the media. Newspapers, T.V. , and radio carry news stories that are either of interest to their audience or directly affect their audience. Often what we learn from the news makes up most of what we know about the subject. While we are aware that this is not the complete story, it is at least a good place to start.

This activity can be used to develop students' collection and organizational skills while learning some things about the business of agriculture.

PROCEDURE

Part 1

Introduction:

1. Discuss some of the information sources that help us to keep up with the current events. Students may suggest the following sources: newspapers, magazines, T.V., and radio.

   Show the students an example of a newspaper item (preferably one related to Agriculture).

   Ask the class what facts they can learn from the article.

Part 2

Construction:

2. Have the students make a scrap-book from 18" X 24" art paper (folded in half). It should contain about 6 pages. (3 pieces of paper.)

Part 3

Collecting & Grouping:

3. Each student will be asked to look for news items which are related to Agriculture.

4. Ask the class to suggest some topics that might be covered. Like the effects of weather, product prices, new developments, government policies, national and international events.

5. Choose 4 or 5 major topic areas and write them on the inside cover of the scrap books.

   Have the students decorate the front page of their scrap book with a drawing or picture.

6. The project should continue for about 6 weeks. Each student should collect a minimum of one news item per week.

7. At the end of the designated time, have the students organize the articles in their scrap books under the various topics they discussed and paste their news items into their books.

Conclusion:

8. Have the students decide what was the major concern for agriculture during this period.

9. Have each student write 3 new facts they learned about Agriculture on the last page of their scrap books. These facts may be taken from information collected by all students in the class or from their own articles.

FOR DISCUSSION

1. Did the season have anything to do with the news related to agriculture?

2. Was agriculture an important news item?

RELATED ACTIVITIES

1. As a class, write a news story about an agricultural event.

ALTERNATE ACTIVITY

Using any of the following head lines, have the students in groups or as individuals write the first paragraph of a news item.

1. Beef Prices Soar.
2. Synthetic Meat Replaces Chicken.
3. The Market for Ostrich Eggs is Declining.
4. Weather Conditions Favour a Good Harvest.
5. Family on Northern Alberta Farm Develops a New Product.
6. Flooding Results in Major Damage To Crop Land.
7. A Revolutional Farm Tractor Floats on Air.
8. Shipment of California Vegetables Full of Bugs.

Transgenic cow seems disease resistant

BY ROBERT KOZAK
Special to The Globe and Mail

A Calgary-based research group says it has created a disease-resistant "transgenic" cow.

Robert Church, associate dean of research with the faculty of medicine at the University of Calgary, said the researchers have a transgenic 1½-year-old Hereford cross that is showing resistance to a viral disease.

Efforts are taking place worldwide to create transgenic creatures, and are centring on making them disease resistant, larger or sources for pharmaceuticals.

The success of the Calgary effort, which includes backing from Alberta Livestock Transplants Ltd. and Alta Genetics Inc., could prove a boon for cattle ranchers.

While the Calgary group has 13 animals that could be called transgenic, only one has been consistently shown to be resistant to bovine viral diarrhea.

A transgenic animal is one whose genetic compostion has been altered to include selected genes from another animal or species by methods other than those used in traditional animal breeding.

"We're seeing if we can increase disease resistance by turning on the interferon in the liver prior to them being challenged by viral disease," Dr. Church said in an interview.

Researchers around the world, including those in Calgary, started working with the first transgenic animals in the early 1980s. (Scientists at Ohio University in Athens, Ohio, are generally credited with creating the first such animal in 1981, after transfering genes from one species of mouse to another.)

While creating disease resistance is important, the work is also trying to turn animals into potential drug factories. "In place of multi-million-dollar fermentation facilities, we can postulate having cattle produce high-value pharmaceuticals and other active peptides in their milk," Dr. Church said.

Recently, scientists in both the United States and Scotland have claimed successes in using genetically engineered mice to make milk that contains a heart-attack prevention drug called tissue plasminogen activator, or TPA.

The Scottish researchers also said they had implanted a gene for a sheep protein in mice, which now produce the protein in their milk.

One problem, though, is that mice are not large milk producers. Goats, cows or sheep would be better candidates.

Still another area of the research is focusing on creating a larger farm animal. "Transgenic animals will be useful in increasing meat production and body weight," said Jiro Nagai, acting chairman of the biotechnology research program at Agriculture Canada's Animal Research Centre in Ottawa.

Problems are being encountered with both the cost and the technical aspects of programming extra growth patterns into farm animals using gene transfers.

Transgenic animals born in U.S. laboratories have not generally been huge successes. For example, transgenic pigs — created using human or bovine growth hormones — have been born, but they don't grow to enormous size.

The problem seems to be to get a hormone that affects so many aspects of the body to express itself in the right way. The transgenic pigs may grow with less fat, but there is no other control over how they grow.

"In agriculture, performance is produced by the gene, and if the gene works without expression, then it is of no use for us," Dr. Nagai said. While researchers have been able to transplant foreign genes into cattle embryos, there is no guarantee that the desired result will be expressed, or produced, in the offspring.

Moreover, when genes are injected into the fertilized animal eggs, piercing the cell walls kills most of the eggs.

"Transgenic animals are unique, each one is different in terms of positions of the genes incorporated and the number of genes incorporated," Dr. Nagai said. "No one knows how the gene is incorporated or where it is incorporated."

Researchers have been able to create mice that are 16 per cent larger in body weight, using rat growth hormones. But while human, cow, rat and mouse growth hormones are available, no one is yet claiming success at making cattle grow bigger with them.

Activity 25

THE AGRIBUSINESS GAME

Activity: Students play a game involving the selection of agriculture related occupations.

Subject Area: Social Studies.

Curriculum Direction: Canada Industrial Development from Region to Region.

Major Concept: Resource development leads to employment and higher standard of living.

Lesson Concept: Agriculture is a diverse industry which is a major employer in Alberta.

Purpose: To present students with the variety of occupations associated with food production and agriculture.

Materials Required: Supplied in this lesson.

Time Required: 1 class period.

BACKGROUND — to the teacher

Many Albertan's jobs are related to the Agriculture Industry. This game focuses on the diversity of Agriculture related occupations.

PROCEDURE

1. Ask students if they can name some occupations that are a part of the Agriculture industry in Alberta. Write their suggestions on the board.

2. When the students have exhausted their ideas, read the list of jobs provided with this lesson.

3. Select enough occupations from the list to total about 30 - 40.

Preparing to play the game:

4. Ask each student to choose an occupation from the job list. They should not tell anyone their choice!

5. Students will then list about 10 descriptive characteristics about the job they have chosen.

The game:

6. One at a time, students will go to the front of the class. We will refer to these students as subjects.

   The subject will give the class <u>one</u> clue about their new job.

7. The class will then bid for the right to guess. Allow 3 bids per round of the game.

8. Write the names of the bidders and their bid on the board.

   Example: "I can name that job in ___ clues."

   When a student has made a bid on a round he/she must wait until the other members of the class have had a chance to bid on a round before he/she can bid again.

9. The subject continues to give clues about their job until someone guesses their job or they have given all ten clues.

Scoring:

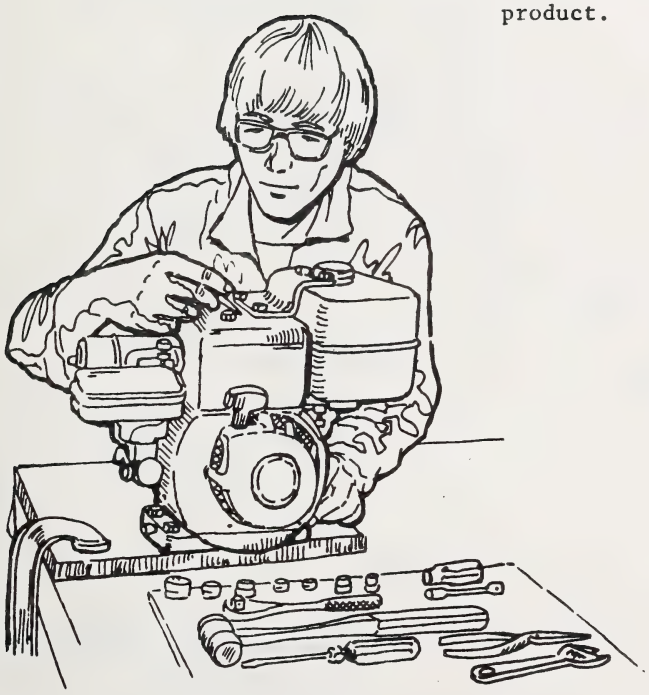
10. a) If the subject's job is not guessed they score 3 points.

b) If the bidder guesses the name of the job within the number of guesses, they receive 2 points.

Example of job and clues:

DAIRY FARMER

1. Job involves a food product.
2. Much work time is spent out of doors.
3. Involved both in producing and selling the product.
4. Lives and works in the same place.
5. Works closely with animals.
6. Some duties must be done seven days a week.
7. Spends much time with cows.
8. Looks after both young and mature animals.
9. The product produced is a white liquid.
10. We should drink one quart each day of this product.



OCCUPATIONS RELATED TO THE AGRICULTURE INDUSTRY

Agriculture Production

- Beef Producer
- Beekeeper
- Broiler Producer
- Dairy Farmer
- Egg Producer
- Feedlot Operator
- Fruit Grower
- Grain Grower
- Greenhouse Operator
- Hog Producer
- Livestock Rancher
- Nursery Producer
- Pedigree Seed Grower
- Sheep Producer

Horticulture

- Floral Designer
- Gardener
- Landscape Designer

Field Crop Services

- Fertilizer and Crop Chemical Salesperson
- Machinery Repairperson
- Plant Breeding Technician
- Seed Testing Technician
- Grain Elevator Agent

Scientific Fields

- Agricultural Economist
- Food Scientist
- Forester
- Plant Scientist
- Animal Scientist
- Soil Scientist

Agricultural Processing

- Butcher
- Cheese Maker
- Dairy Products Tester
- Grain & Flour Miller
- Fruit & Vegetable Grader
- Meat Cutter
- Meat Inspector
- Meat Processing Manager
- Poultry Processing Manager

Animal Health Services

- Animal Health Technician
- Feedlot Technician
- Veterinary Assistant
- Veterinarian

Animal Production Services

- Brand Inspector
- Dairy Inspector
- Feedmill Operator
- Livestock Buyer

Engineering & Equipment

- Building Designers
- Irrigation Engineer
- Livestock Equipment Engineer

Sales

- Farm Machinery Salesperson
- Farm Supplies and Hardware Salesperson
- Feeds Salesperson